469221

NAVAL RESEARCH LABORATORY Washington, D.C.

FACT BOOK

AUGUST 1970

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This document has been prepared as a reference source of factual information about the Naval Research Laboratory.

August 1970

CONTENTS

Aerial view of the Naval Research Laboratory main site

The Naval Research Laboratory

MISSION

The mission of the Naval Research Laboratory is to conduct scientific research and development in the physical sciences and related fields directed toward new and improved materials, equipment, techniques, and systems for the Navy. In fulfillment of this mission, the Naval Research Laboratory:

1. Initiates and conducts scientific research and development of a basic and long-range nature in scientific areas of special interest to the Navy.

2. Performs scientific research and development for the Systems Commands and offices of the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

3. Provides to the Navy and its contractors standardized techniques and procedures for measurements and for the accurate calibration of standard instruments in areas of special Navy needs.

4. Furnishes scientific consultative services for the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

5. Provides to the Navy unbiased determination of performance charactersitcis of developmental and prototype devices through limited engineering test and evaluation services.

THE NAVY'S CORPORATE LABORATORY

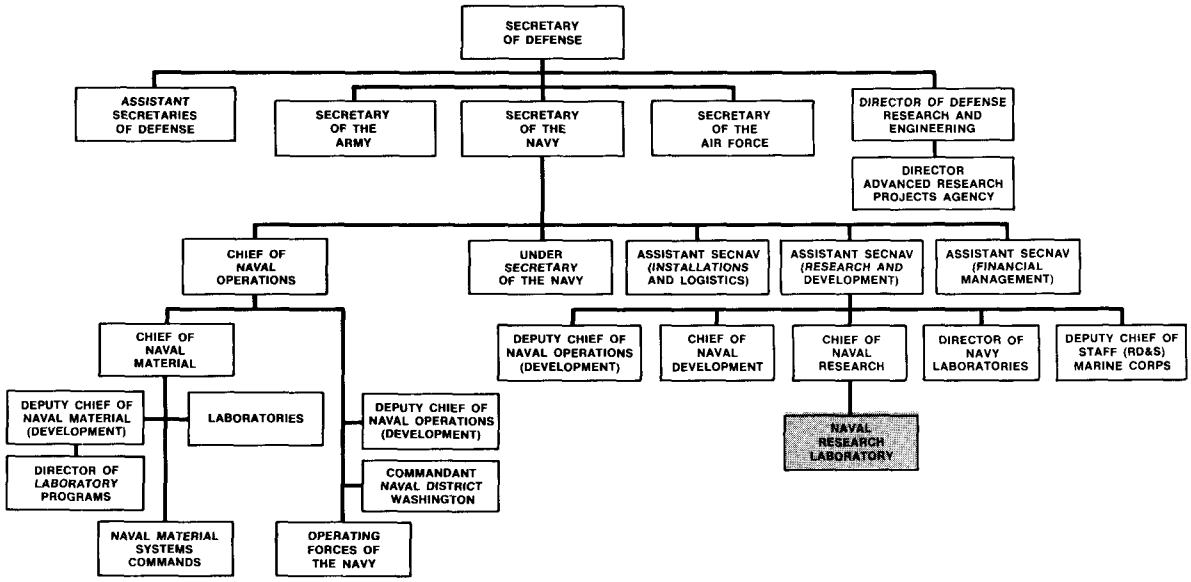
The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that advancements in science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences, in advanced engineering, and in naval analysis. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in radio wave propagation, oceanography, deep-sea instrumentation, submarine air purification, structural design theory, fracture mechanics, surface chemistry, optical physics, radar, underwater sound propagation, acoustic signal processing, sonar transducers, nuclear physics, radio astronomy, high-temperature lubricant, high-energy fuels, plasma physics, refractory metals, exotic materials for high-performance structures, x-ray astronomy, high-power lasers, solid-state physics, and stress-corrosion cracking of high-strength titanium steels and aluminum alloys.

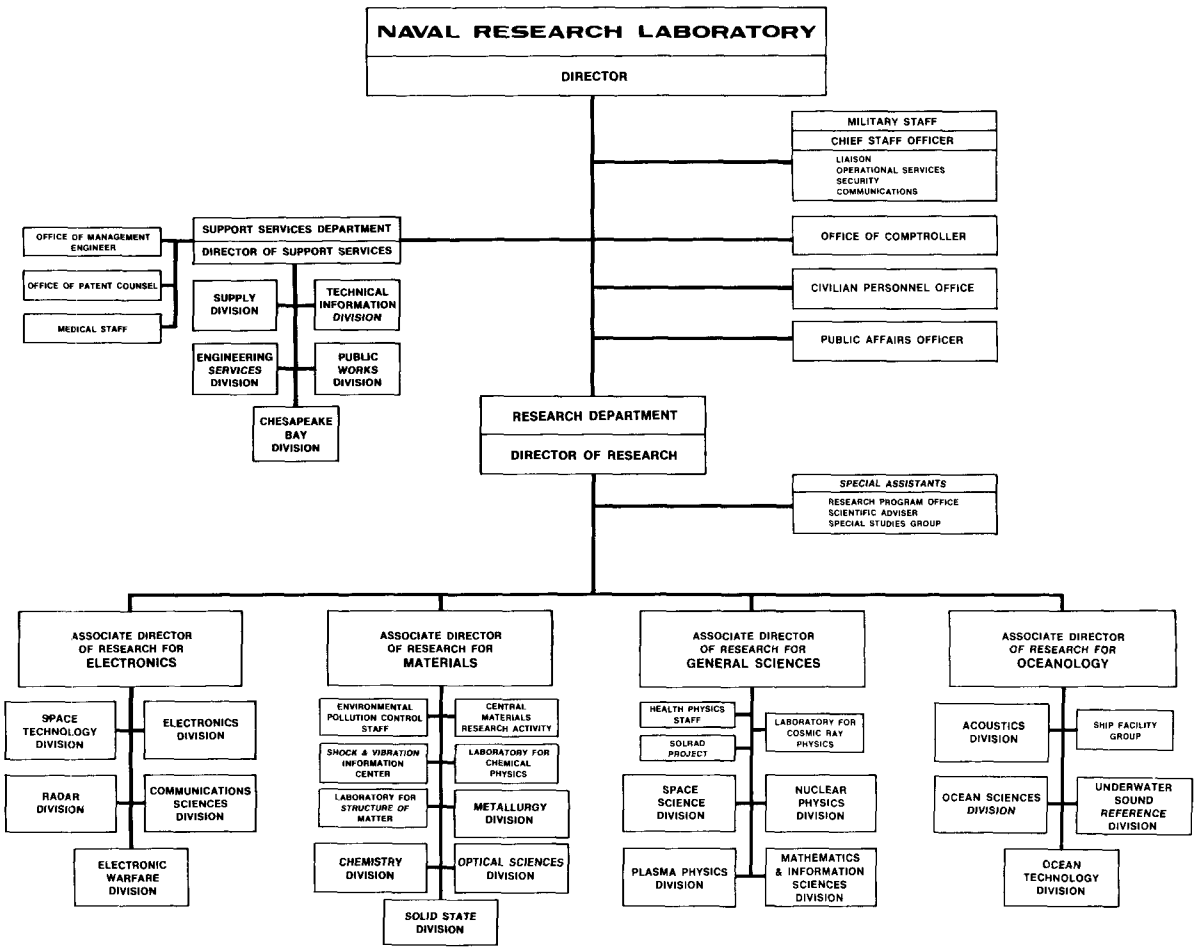
Over 1200 scientific and technical papers were produced in 1969 as a consequence of the research and development effort of the Laboratory staff. The figure includes 198 formal reports, 123 memorandum reports, 387 articles published in professional society journals, and 558 papers presented at scientific and technical meetings in the United States and in foreign countries.

In addition, 51 U.S. Patents were issued in 1969 on inventions made by present and former employees of the Naval Research Laboratory. This figure brings the grand total of NRL patents, through the calendar year 1969, to 2161.

In its investigations of broad scientific areas, in considering its findings for potential military applications, and in furnishing to the Naval Systems Commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. Thus it provides a central focus of research and development activity that supports the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the Army, the Air Force, the Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.



Position of NRL in the Department of Defense structure



Organization chart of NRL

MILITARY AND CIVILIAN PERSONNEL

Military Personnel Attached to NRL as of July 31, 1970

Officers	*Authorized*	*On Board*
Captain	3	3
Commander	9	7
Lieutenant Commander	11	3
Lieutenant	10	10
Lieutenant (Junior Grade)	0	5
Ensign	0	1
Warrant Officer	1	0
Total	34	29
Enlisted	57	64

Civilian Employees on Rolls as of July 1, 1970

10 USC 1581 (formerly Public Law 313)		23
Classification Act (GS)		2589
Scientific & Professional	1233	
Technical Supporting	653	
General Administrative & Clerical	703	
Wage Board		793
General Wage Service (WG)	611	
Apprentices, Planning, Estimating, etc. (WD)	81	
Printing & Lithographic Service (WI)	14	
Supervisory General Wage Service (WS)	65	
Inspection Service (WX)	10	
Leader (WL)	12	
Total		3405

Annual Civilian Turnover Rate (percent)

	1969	1970
Research Department	5.0	4.9
Nonresearch Areas	10.8	11.6
Entire Laboratory	7.5	7.8

Highest Academic Degrees Held by Permanent Employees (as of April 10, 1970)

Bachelors	687
Masters	316
Doctorates	363

FISCAL INFORMATION

NRL FUNDING BY MAJOR SPONSOR

FISCAL YEARS 1970 AND 1971

Sponsor	FY 1970 (Act)		FY 1971 (Est)	
	Millions of Dollars	Percent	Millions of Dollars	Percent
R&D PROGRAM				
ONR	32.1	32.5	33.5	33.1
SHIP	14.5	14.6	14.3	14.1
ELEX	4.9	4.9	6.5	6.4
AIR	13.4	13.5	14.6	14.4
ORD	1.9	1.9	2.8	2.8
OTHER NAVY	2.8	2.8	3.2	3.2
TOTAL NAVY	69.6	70.2	74.9	74.0
OTHER DOD	15.8	15.0	15.0	14.8
NON-DOD	10.9	11.0	8.1	8.0
TOTAL R&D	96.3	97.1	98.0	96.8
NON R&D	1.8	1.8	1.8	1.8
TOTAL NIF	98.1	98.9	99.8	98.6
CAPITAL IMPROVEMENT	1.1	1.1	1.4	1.4
TOTAL FUNDS	99.2	100.0	101.2	100.0

EXPENDITURES
(Excluding Plant Account Funds)
FY 1970-1971

Purpose	During FY 1970	During FY 1971
Materials, supplies and parts	$ 10,500,000	$ 11,900,000
Salaries and wages	50,600,000	52,500,000
Contractural services and other costs	37,000,000	35,400,000
TOTAL	$ 98,100,000	$ 99,800,000

CAPITAL PROPERTY

	As of May 31, 1970
Class 1 (Land)	$ 451,989
Class 2 (Buildings and improvements)	68,191,790
Class 3 (Equipment)	13,712,179
Class 4 (Industrial production equipment)	10,821,582
TOTAL CAPITAL PROPERTY	$ 93,177,540

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Office of the Director

Captain Earle W. Sapp, USN
Director, Naval Research Laboratory

Captain Sapp [redacted], [redacted], Maryland. He attended Duke University from 1944 to 1947, where he majored in physics while in the Naval Reserve Officers Training Corps. He graduated in March 1947 and was commissioned Ensign, USN, at that time. He is a graduate of the Naval War College and has attended several Naval schools in the areas of antisubmarine warfare equipment and tactics, combat information center operations, and naval electronics. Captain Sapp also has attended special oceanographic courses, and his Navy technical subspecialty is oceanography.

Captain Sapp is a line officer and is qualified to command destroyers. During his naval career, Captain Sapp acquired broad operational and command experience in destroyer-type ships and in fleet staffs. He has commanded the experimental destroyer escort USS MALOY (EDE 791) and the fleet destroyer USS EUGENE A. GREENE (DD 711). His fleet experience includes deployments to both the European and Southeast Asia theaters, as well as experimental antisubmarine warfare operations.

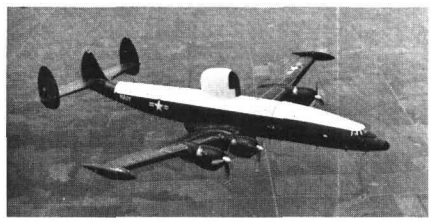
Captain Sapp's R&D experience includes project assignments in fleet evaluation activities, in the Office of Naval Research, and in experimental ships assigned to Navy laboratories and the operational test and evaluation force. Prior to assuming the position of Director of the Laboratory on June 30, 1970, he was on the staff of the Director of Defense Research and Engineering, where he served as Deputy to the Assistant Director for Ocean Control.

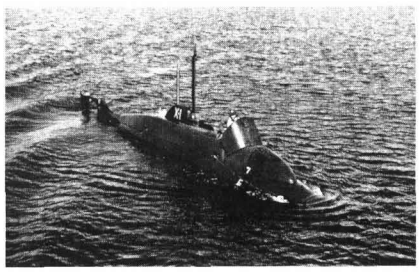
He is a member of the Acoustical Society of America and the American Society of Naval Engineers.

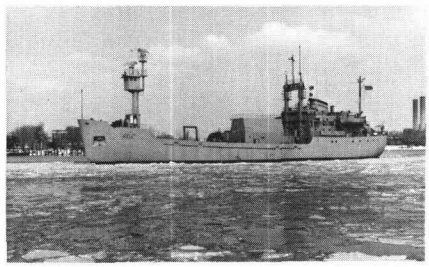
Military Staff Office

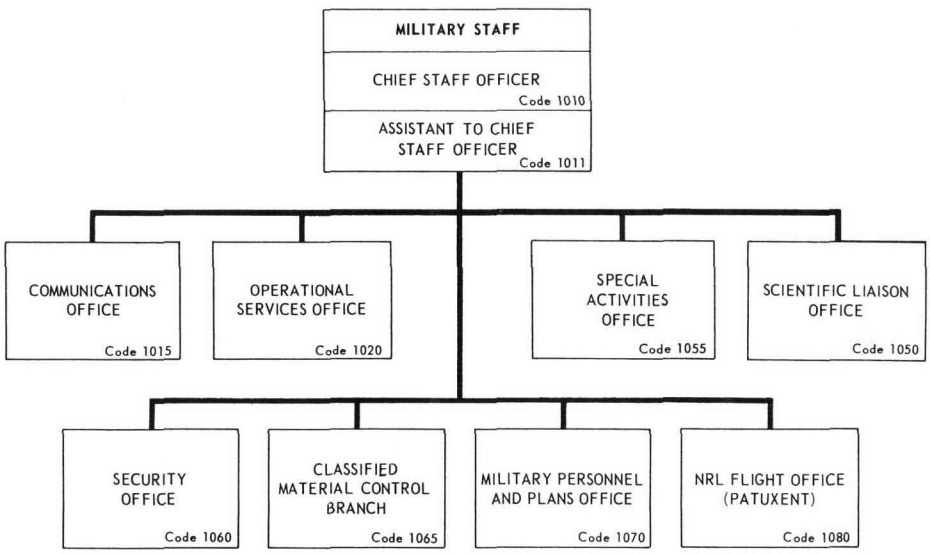
CDR L. R. Marshall, USN

- MILITARY PERSONNEL
- MILITARY PLANS
- OPERATIONAL SERVICES
- SCIENTIFIC LIAISON
- SECURITY
- COMMUNICATIONS









Basic Responsibilities

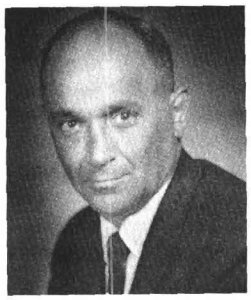
The Chief Staff Officer provides a military staff to the Director, Naval Research Laboratory, for the purpose of assisting the Director in the military aspects of the management of the Laboratory. He conducts liaison with DOD and Navy Commands and activities and the operating forces of the Navy in support of NRL research and development operations and the coordination of the military application of the scientific work of the Laboratory. The Staff supports four multi-engine Laboratory aircraft and obtains and coordinates such additional air, surface, and subsurface services as are required. The Military Staff is also responsible for personnel and plant security, communications, and control of classified material.

Key Personnel

Name	*Title*
CDR L. R. Marshall, USN	Chief Staff Officer (Acting)
LTJG L. B. Hull, USNR	Communications Officer
CDR D. F. Moxley	Operational Services Officer
CDR W. E. Heyl, USN	Scientific Liaison Officer
Mr. W. C. Bryan	Head, Special Activities Office
Mr. C. J. Dryer	Head, Security Branch
Mr. J. J. Bagley	Classified Material Control Officer
LT N. K. Matheson, USN	Military Personnel and Plans Officer
LCDR F. C. Nelson, USN	Head, NRL Flight Office (Patuxent)

Personnel Complement

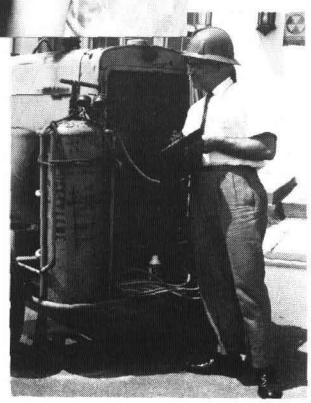
On Board: 152
(82 Civilian, 70 Military)

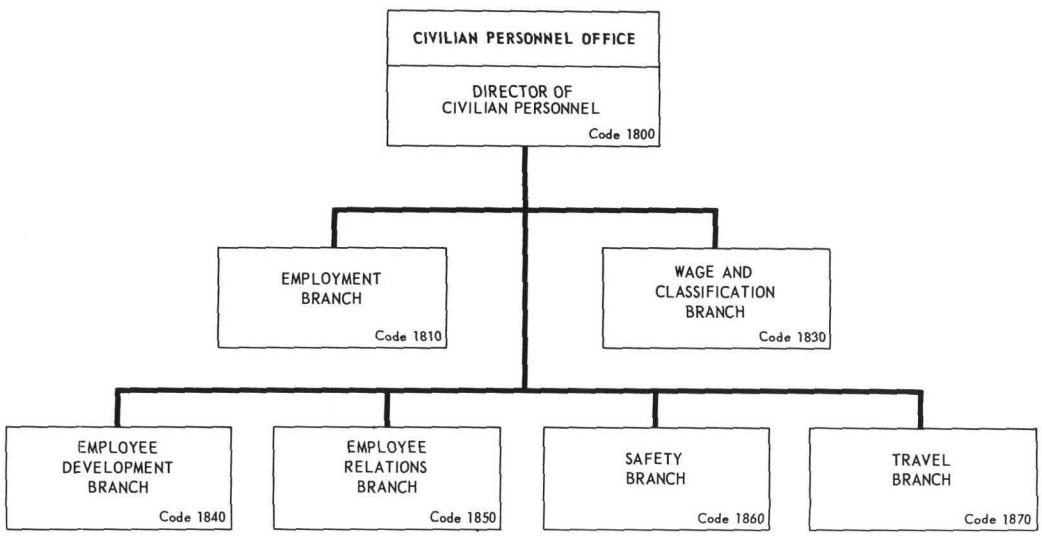


Civilian Personnel Office

Mr. A. G. Gross

- EMPLOYMENT
- WAGE AND CLASSIFICATION
- EMPLOYEE DEVELOPMENT
- EMPLOYEE RELATIONS
- SAFETY
- TRAVEL





Basic Responsibilities

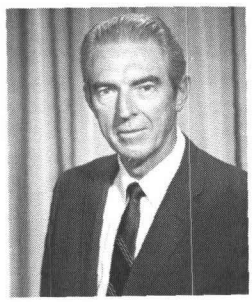
The Civilian Personnel Office administers the Laboratory's personnel program, which provides for the selection, development, promotion, utilization, appropriate recognition, travel, and safety of all civilian personnel. It is also responsible for the establishment and review of all Classification Act and ungraded positions.

Key Personnel

Name	*Title*
Mr. A. G. Gross	Director of Civilian Personnel
Mr. J. E. Goss	Head, Employment Branch
Mr. K. R. Harper	Head, Wage and Classification Branch
Mr. W. J. McLaughlin	Head, Employee Development Branch
Mr. H. H. Kay	Head, Employee Relations Branch
Dr. R. G. Nebelung	Head, Safety Branch
Mrs. M. M. Harden	Head, Travel Branch

Personnel Complement

On Board: 48



Office of the Comptroller

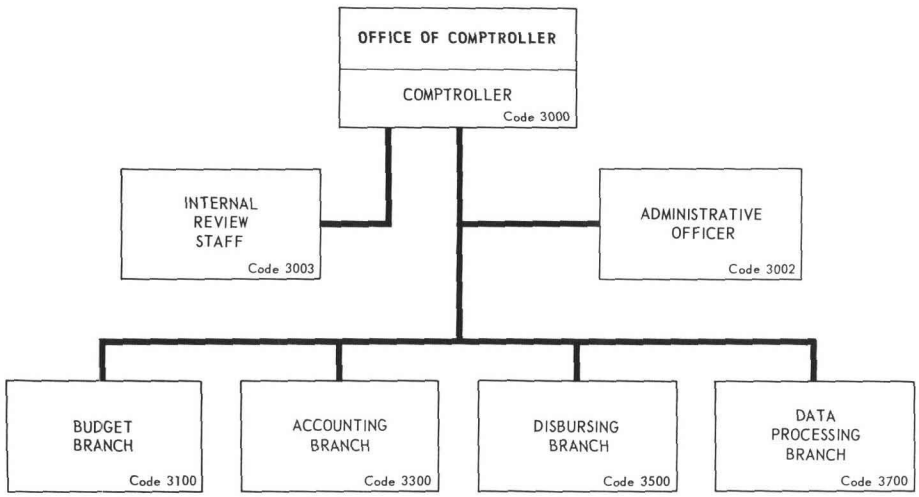
Mr. J. P. Donovan

INTERNAL REVIEW

BUDGET OFFICE

COMPUTER

- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



Basic Responsibilities

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers the financial program of the Laboratory.

Key Personnel

Name	*Title*
Mr. J. P. Donovan	Comptroller
Mr. D. M. Johnson	Budget Officer
Mr. D. K. Jones	Accounting Officer
LTJG R. L. Klaphake, SC, USNR	Disbursing Officer
Mr. R. L. Guest	Data Processing Officer
Mr. R. A. Showman	Head, Internal Review Staff

Personnel Complement

On Board: 70

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The Research Department

Dr. Alan Berman
Director of Research

Dr. Berman [redacted]. He received the A.B. degree in physics from Columbia College in 1947 and the Ph.D. degree in physics from Columbia University in 1952.

From 1952 to 1955 he was a research scientist at the Hudson Laboratories of Columbia University. He became Assistant Director of Hudson Laboratories in 1955, Associate Director in 1957, and Director in 1963. On May 29, 1967, Dr. Berman became Director of Research for the Naval Research Laboratory.

Dr. Berman's research specialties include the areas of underwater acoustics, oceanography, and signal processing. He has published numerous papers on these and related subjects. At present he is a member or chairman of a wide variety of Navy and oceanographic advisory groups. He also provides advisory services for a number of Department of Defense and other Government agencies.

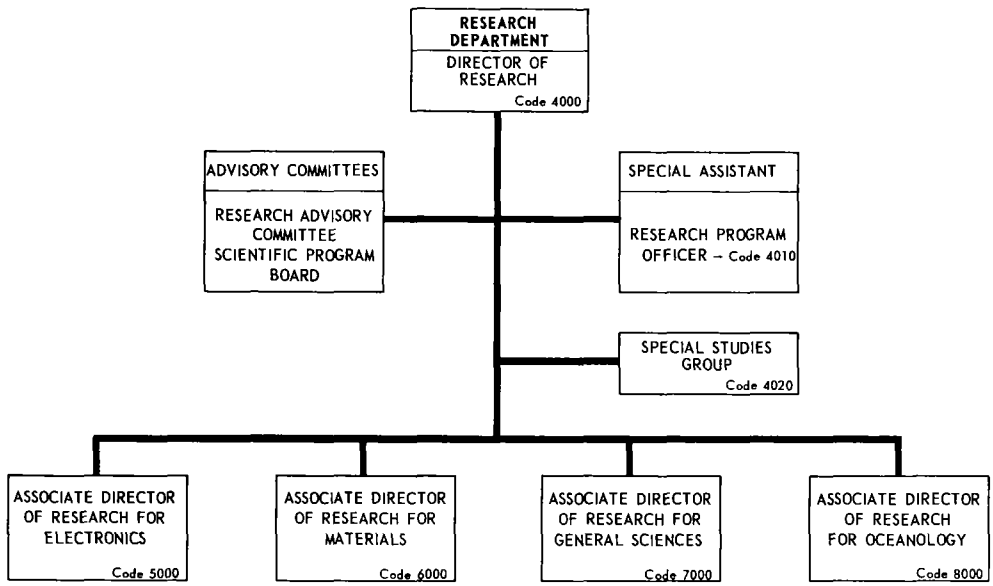
Dr. Berman has on three occasions been visiting scientist to the Admiralty Research Laboratory, Teddington, England (1955, 1957, 1960), and once at the SACLANT ASW Research Center, La Spezia, Italy (1960).

THE RESEARCH DEPARTMENT

The Research Department is headed by a civilian scientist and administrator. The research effort is divided into four major fields–electronics, materials, general sciences, and oceanology–which correspond to the principal areas of the Navy's interest in the physical and engineering sciences. There is an associate director of research for each of these four broad areas. Seventeen scientific divisions, each headed by a civilian scientist, pursue work in specific fields. Branches within these divisions form interrelated working units.

Key Personnel

Name	Title	Code
Dr. A. Berman	Director of Research	4000
Mr. H. P. Gates	Consultant	
Mr. E. L. Brancato	Consultant	
Mr. A. Hollings	Research Program Office	4010
Mr. C. L. Tipton	Special Studies Group	4020
Dr. W. R. Faust	Associate Director of Research for Electronics (Acting)	5000
Dr. J. H. Schulman	Associate Director of Research for Materials	6000
Dr. W. C. Hall	Associate Director of Research for General Sciences	7000
Dr. R. R. Goodman	Associate Director of Research for Oceanology	8000



RESEARCH PROGRAM OFFICE

Basic Responsibilities

The Research Program Office serves as staff to the research directorate of the Laboratory. It provides an orderly plan for coordinating NRL research programs with those of ONR and other sponsors or potential sponsors throughout the Departments of the Navy, the Army, and the Air Force, the Advanced Research Projects Agency, and other agencies of the government. It also serves as a focal point for program information for project managers and other key personnel of sponsoring activities on work in progress or in various stages of planning. The Research Program Office maintains a management information center which serves as a working tool for the Laboratory directorate, and it maintains appropriate records of the Laboratory's research programs.

Key Personnel

Name	*Title*
Mr. A. J. Hollings	Head, Research Program Office
Mr. R. E. Seebold	Deputy Head, Research Program Office
Mr. R. C. Spragg	Head, Management Information Center Section
Mr. R. E. Seebold	Head, Short-Range Program Planning and Appraisal Section
Mr. N. Moglin	Staff Assistant—ADP

Mr. A. J. Hollings

Personnel Complement

On Board: 11

SPECIAL STUDIES GROUP

Basic Responsibilities

The Special Studies Group provides analytical staff support to the Director of Research in the fields of strategic, tactical, and special naval warfare. Programs of operation research and system analysis are undertaken to provide substantive analytical bases for (a) the orientation of naval research and development, and (b) the general delineation of advanced naval weapon systems and force structures requirements for the mid- to long-range time period. Broad scope analyses of projected threats, operations, tactics, equipments, and forces are conducted by four study units—Operations Analysis; Systems Analysis; Systems Applications; and Amphibious Warfare, respectively.

Key Personnel

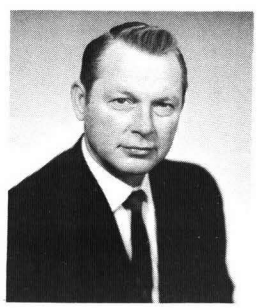
Name	*Title*
Mr. C. L. Tipton	Head, Special Studies Group
Mr. J. Reynolds	NRL Special Warfare Assistant

Personnel Complement

On Board: 10

Total Estimated R&D Funding

Fiscal Year 1971: $1,000,000 (Projected)



Mr. C. L. Tipton

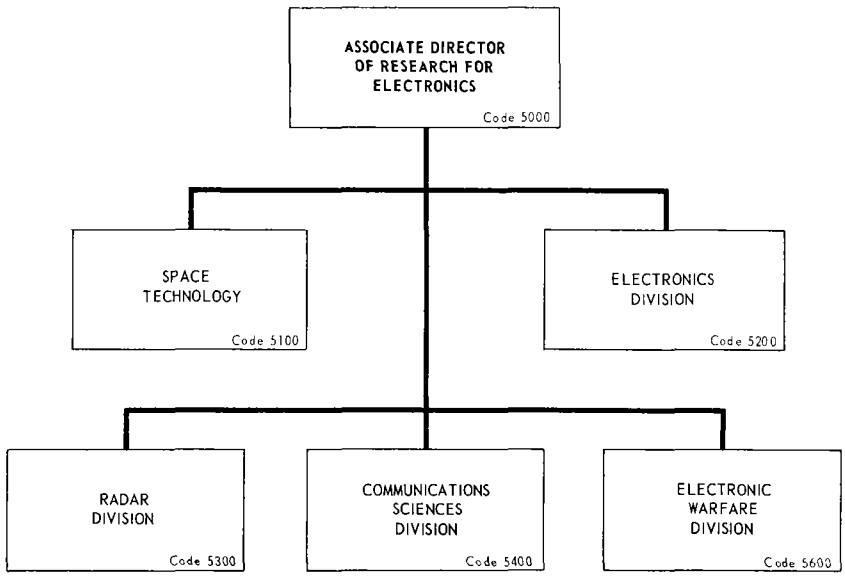
Electronics Area

Dr. W. R. Faust
Associate Director of Research for Electronics

Dr. Faust [redacted]. He graduated from Oklahoma State University in 1939 with a B.S. degree in electrical engineering and from the Illinois Institute of Technology in 1941 with an M.S. degree in electrical engineering. In 1948, he received the Ph.D. degree in physics from the University of Maryland.

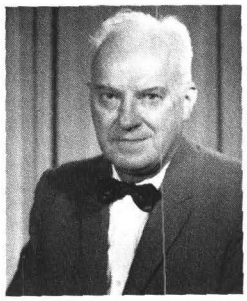
Dr. Faust joined the Research Department of NRL in 1941 and became Head of the Nuclear Reactions Branch of the Radiation Division in 1952. He was appointed Associate Superintendent of the Radiation Division and Head of the Analysis and Theory Branch in 1956, positions he held until January 1964, when he was detailed Superintendent of the Applications Research Division. At the present time, he is Associate Director of Research for Electronics (Acting).

Dr. Faust is a Fellow of the American Physical Society of America and a member of numerous other professional and honorary societies.



Key Personnel

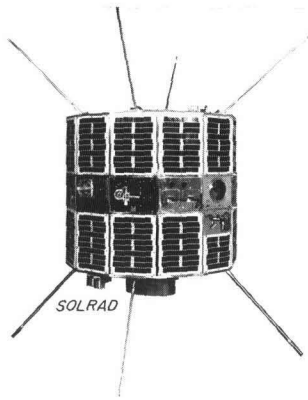
Dr. W. R. Faust	Associate Director of Research for Electronics (Acting)
Mr. L. A. Gebhard	Consultant
Mr. H. Bress	Consultant
Mr. E. F. Kulikowski	Superintendent, Space Technology Division (Acting)
Mr. A. Brodzinsky	Superintendent, Electronics Division
Dr. M. I. Skolnik	Superintendent, Radar Division
Dr. L. B. Wetzel	Superintendent, Communications Sciences Division
Mr. H. O. Lorenzen	Superintendent, Electronic Warfare Division



Mr. E. F. Kulikowski

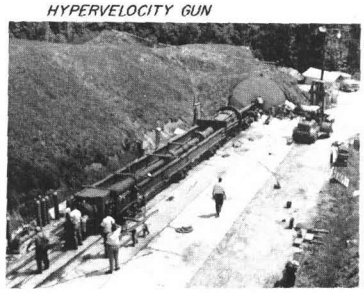
Space Technology Division

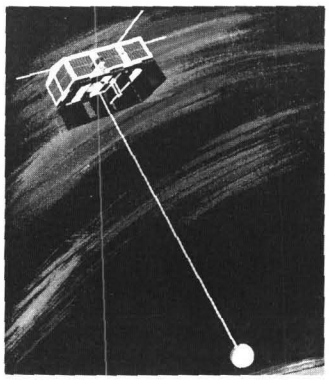
- APPLIED PHYSICS
- OPERATIONAL RESEARCH
- SPACE APPLICATIONS
- SATELLITE TECHNIQUES
- DYNAMICS



SOLRAD

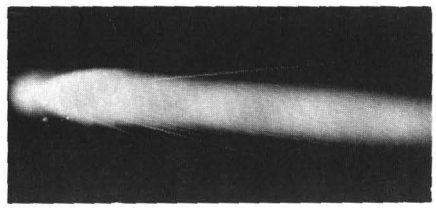
HYPERVELOCITY GUN

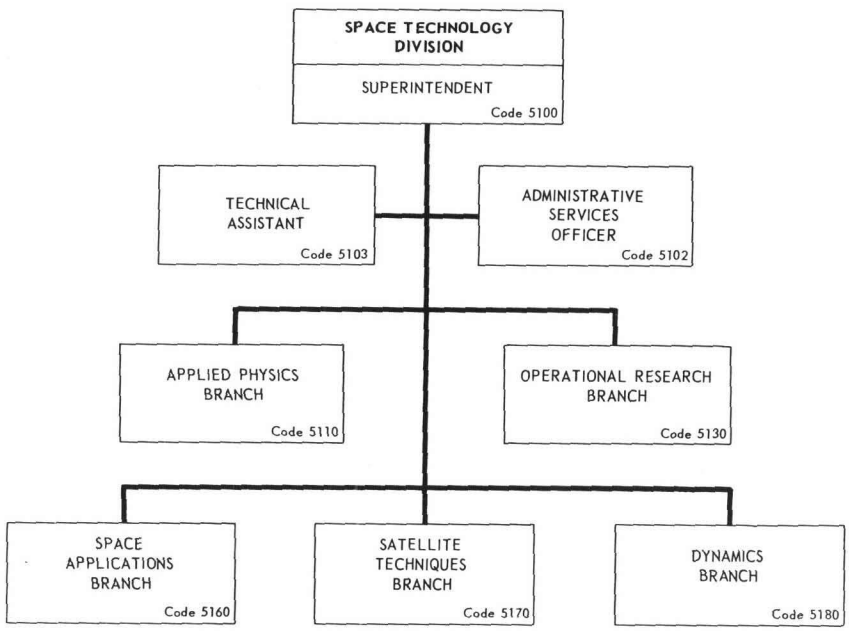




TIMATION

ROCKET PLASMA STUDIES





Basic Responsibilities

The Space Technology Division conducts research and development in the fields of plasma physics, laser systems, defense against ballistic missiles including impact and penetration ballistics, data handling and processing, satellite techniques, and celestial mechanics and satellite navigation. As a result of these studies, the Division designs and develops systems (e.g., satellites) and components (e.g., antennas for use in space) as related to such naval requirements as target identification, surveillance, satellite navigation, satellite geodesy, guidance, and communications and provides for the evaluation of such systems.

Branches

Applied Physics

- Lasers
- Space physics and quantum electronics
- Plasma physics

Operational Research

- Orbit computation and celestial mechanics
- Fire and missile control evaluation instrumentation
- Satellite telemetry data processing

Space Applications

- Satellite navigation
- Satellite geodesy
- Frequency standards

Satellite Techniques

- Satellite development
- Gravity gradient stabilization of satellites
- Research satellites, especially solar radiation devices
- Calibration satellites

Dynamics

- Vulnerability mechanics
- Hypervelocity kill mechanisms
- Hypervelocity impact mechanics

Key Personnel

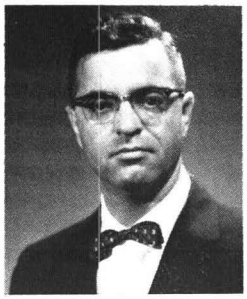
Name	*Title*
Mr. E. F. Kulikowski	Superintendent (Acting)
Mr. E. W. Peterkin	Technical Assistant to Superintendent
Dr. W. S. Ament	Consultant
Mr. D.J. McLaughlin	Head, Applied Physics Branch (Acting)
Mr. C. H. Chrisman	Head, Operational Research Branch
Mr. R. L. Easton	Head, Space Applications Branch
Mr. P. G. Wilhelm	Head, Satellite Techniques Branch
Mr. W. W. Atkins	Head, Dynamics Branch

Personnel Complement

On Board: 152

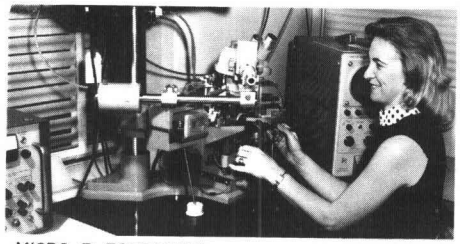
Total Estimated R&D Funding

Fiscal Year 1971: $9,444,000

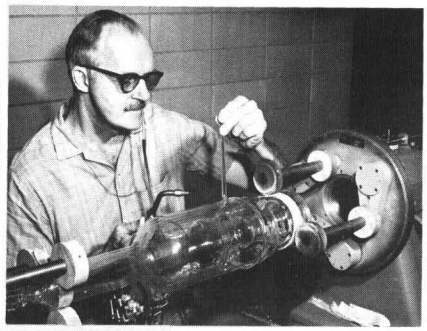


Mr. A. Brodzinsky

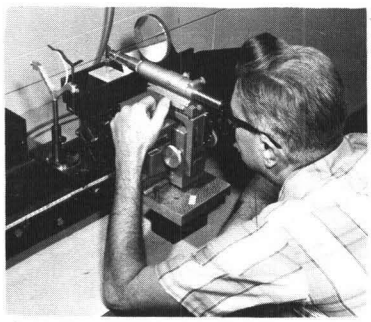
Electronics Division



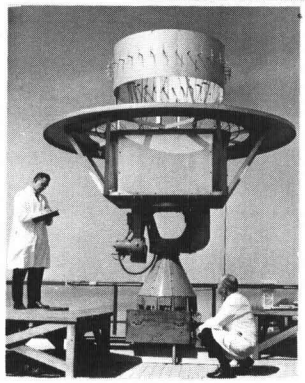
MICRO ELECTRONICS



GAS LASERS

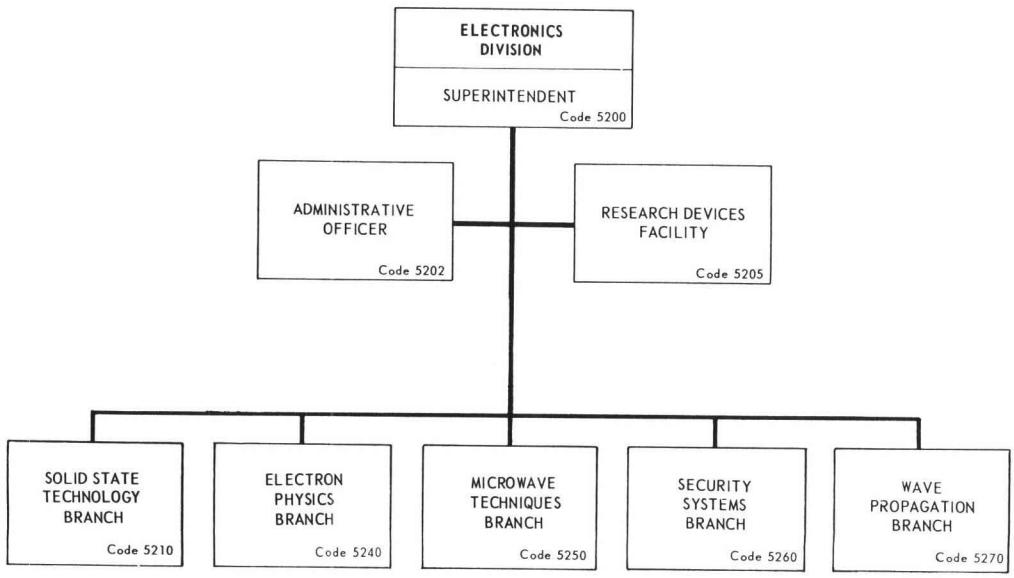


ELECTRO OPTICAL SYSTEMS



ANTENNA RESEARCH

- SOLID STATE TECHNOLOGY
- ELECTRON PHYSICS
- MICROWAVE TECHNIQUES
- SECURITY SYSTEMS
- WAVE PROPAGATION



Basic Responsibilities

The Electronics Division carries out programs of basic and applied research and development in the fields of electronic properties of solid materials, microwave antennas and components, microelectronic technology, electronic identification systems, electromagnetic wave propagation, properties of ground and sea surface radar returns, and vacuum and gaseous electron devices.

Branches

Solid State Technology

- Semiconductor devices, materials and circuits, both low and microwave frequencies
- Thin films

Electron Physics

- Microwave tubes
- Surface physics research
- Microwave components

Microwave Techniques

- Millimeter wave communication system
- Naval electronic scanning antennas for airborne use
- Advanced microwave antenna research
- Microwave electronic components

Security Systems

- Development of new IFF systems and components
- Development of solid state transmitters at L-band
- Development of IFF decision devices
- Consulting services to AIMS* tri-service program

Wave Propagation

- Properties of ground and sea surface radar echoes
- Radar mapping of terrain
- Target cross section measurements
- Sea surface analysis

*AIMS

A - Air Traffic Control Radar Beacon
I - IFF (Identification Friend or Foe)
M - Mark XII
S - System

Key Personnel

Name	*Title*
Mr. A. Brodzinsky	Superintendent
Dr. R. W. Wright	Associate Superintendent
Mr. T. E. Hanley	Head, Research Devices Facility
Dr. J. E. Davey	Head, Solid State Technology Branch (Acting)
Dr. S. T. Smith	Head, Electron Physics Branch
Mr. R. M. Brown	Head, Microwave Techniques Branch (Acting)
Mr. C. V. Parker	Head, Security Systems Branch
Mr. N. W. Guinard	Head, Wave Propagation Branch

Personnel Complement

On Board: 122

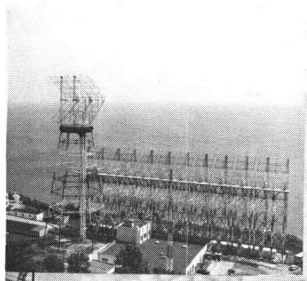
Total Estimated R&D Funding

Fiscal Year 1971: $4,000,000

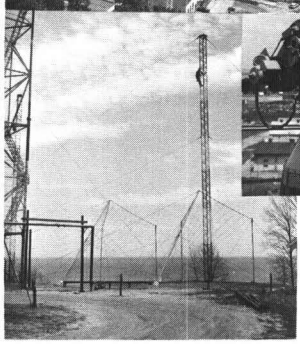
Radar Division

Dr. M. I. Skolnik

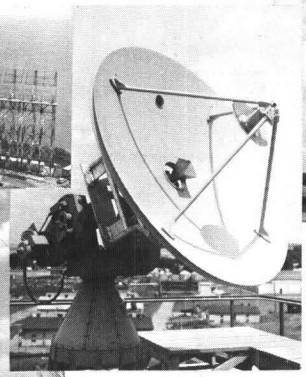
HF ADVANCED-RESEARCH RADAR



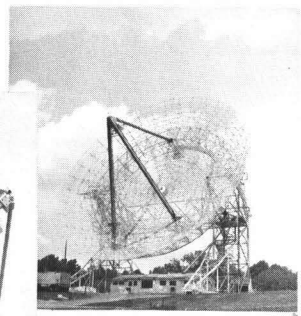
HF SURFACE WAVE ANTENNA



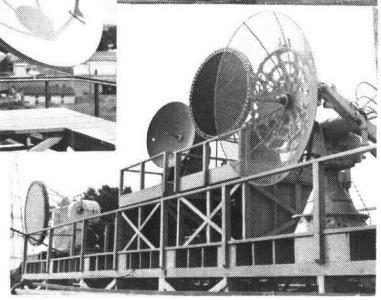
MARK 50 MONOPULSE RADAR



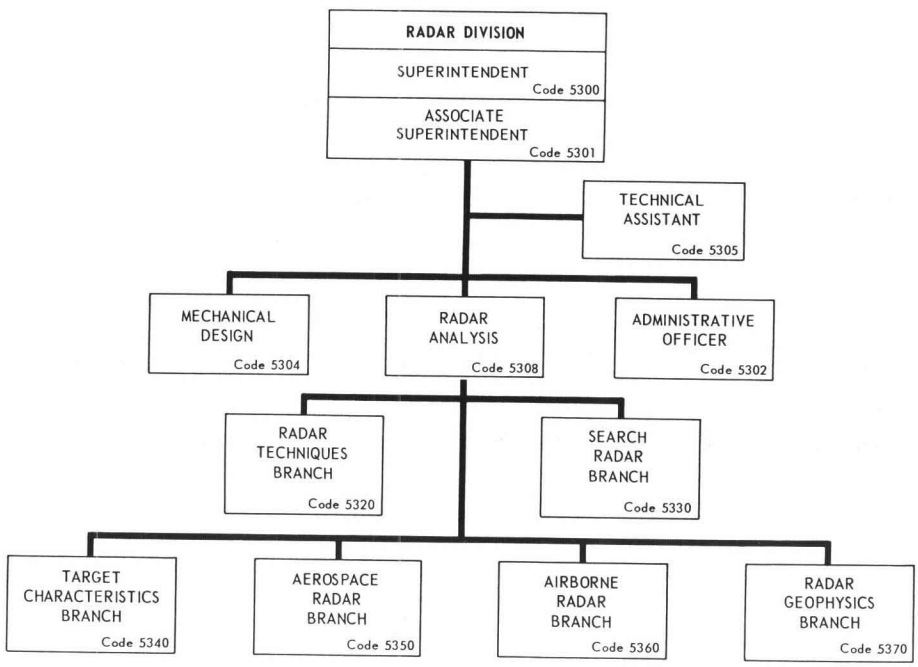
RANDLE CLIFF RADAR



MULTI-BAND EXPERIMENTAL RADAR COMPLEX



- RADAR TECHNIQUES
- SEARCH RADAR
- TARGET CHARACTERISTICS
- AEROSPACE RADAR
- AIRBORNE RADAR
- RADAR GEOPHYSICS



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analysis and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors which are applicable to enhancing the Navy's ability to fulfill its mission.

Branches

Radar Techniques

- High-frequency radar
- Signal processing

Search Radar

- Phased array techniques
- ASW radar
- Precision tracking radar techniques
- Radar evaluation
- Range instrumentation

Target Characteristics

- Target signature analysis
- Target radar-spectra studies
- Laser sensor systems

Aerospace Radar

- Ocean surveillance

Airborne Radar

- Airborne radar
- Weapons analysis
- ECCM
- Airborne early warning radar
- Moving target indication techniques for ship and airborne radars

Radar Geophysics

- Wave propagation
- Studies of ionosphere by means of radar and satellite transmissions
- Radar measurements of satellites and ballistic missiles

Key Personnel

Name	*Title*
Dr. M. I. Skolnik	Superintendent
Mr. J. H. Dunn	Associate Superintendent
Mr. W. N. Shaddix	Technical Assistant
Mr. S. F. George	Radar Analysis Staff
Mr. F. M. Gager	Head, Radar Techniques Branch
Dr. R. J. Adams	Head, Search Radar Branch
Mr. I. D. Olin	Head, Target Characteristics Branch
Mr. R. E. Ellis	Head, Aerospace Radar Branch
Mr. D. L. Ringwalt	Head, Airborne Radar Branch
Mr. L. V. Blake	Head, Radar Geophysics Branch

Personnel Complement

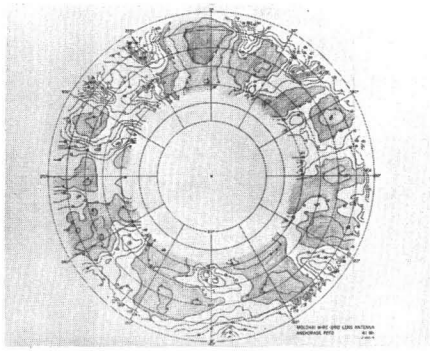
On Board: 175

Total Estimated R&D Funding

Fiscal Year 1971: $6,948,000

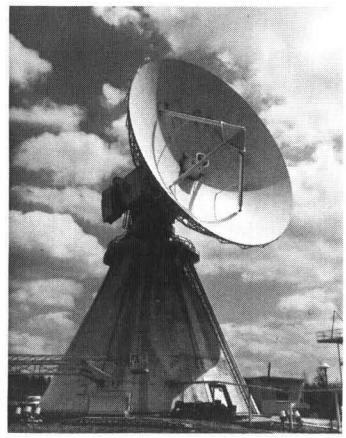
Dr. L. B. Wetzel

Communications Sciences Division

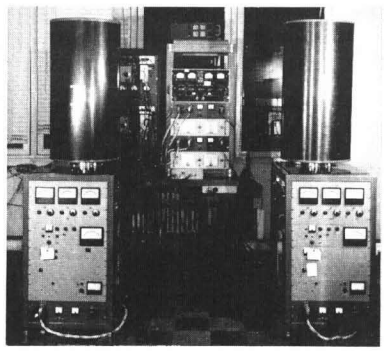


ANTENNA PATTERN MEASUREMENT

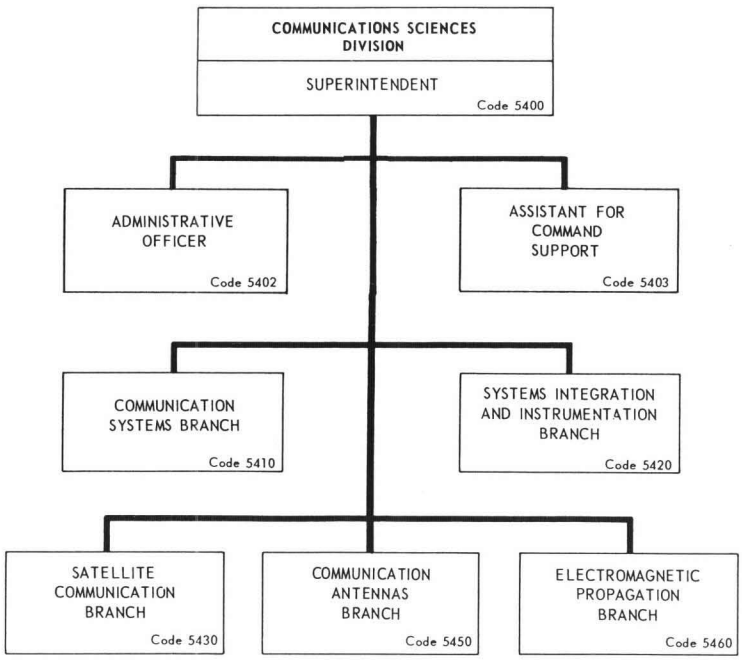
MICROWAVE SPACE RESEARCH FACILITY



- COMMUNICATION SYSTEMS
- SYSTEMS INTEGRATION AND INSTRUMENTATION
- SATELLITE COMMUNICATION
- COMMUNICATION ANTENNAS
- ELECTROMAGNETIC PROPAGATION



HYDROGEN MASER TIME STANDARDS



Basic Responsibilities

The Communications Sciences Division conducts research and development in the systems, sensors, techniques, instrumentation, and phenomenology of radio communications. The major emphasis is placed on those new concepts and techniques which will specifically enhance the Navy's communications capabilities.

Branches

Communication Systems

Secure communications
Modem and interface functions
Crypto-logic systems

Systems Integration and Instrumentation

Precise frequency and time
Centralized electronic control
Integrated communication, navigation and identification systems
Long range aircraft navigation (OMEGA)
Advanced monitoring & testing techniques

Satellite Communication

Satellite communication systems
Precision satellite communication experiments
Modem studies
Orbit parameter studies

Communication Antennas

Communication antenna studies
Antenna circuitry
Underwater reception and propagation

Electromagnetic Propagation

ELF/VLF and LF propagation studies
Noise measurements and predictions
Microwave troposcatter
Effects of propagation on navigational accuracy

Key Personnel

Name	*Title*
Dr. L. B. Wetzel	Superintendent
Mr. R. G. Tuttle	Assistant for Command Support
Dr. J. Galejs	Head, Advanced Studies Staff
Mr. C. B. Davis	Head, Communication Systems Branch
Mr. D. I. Himes	Head, Systems Integration and Instrumentation Branch
Mr. J. P. Leiphart	Head, Satellite Communication Branch
Mr. M. L. Musselman	Head, Communication Antennas Branch
Mr. W. E. Garner	Head, Electromagnetic Propagation Branch

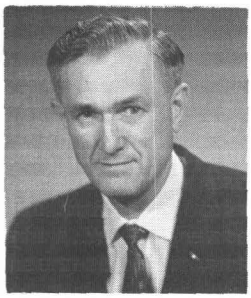
Personnel Complement

On Board: 131

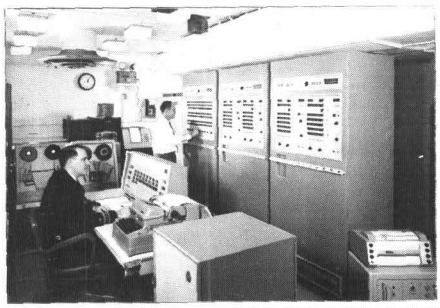
Total Estimated R&D Funding

Fiscal Year 1971: $7,077,900

Electronic Warfare Division

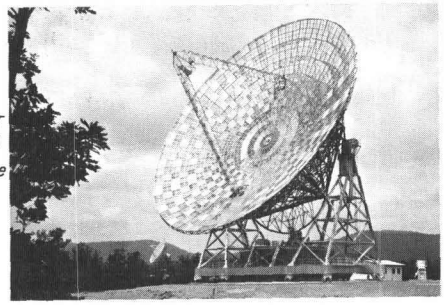


Mr. H. O. Lorenzen

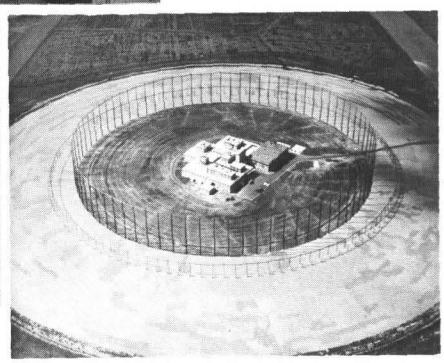


TACTICAL DATA PROCESSING

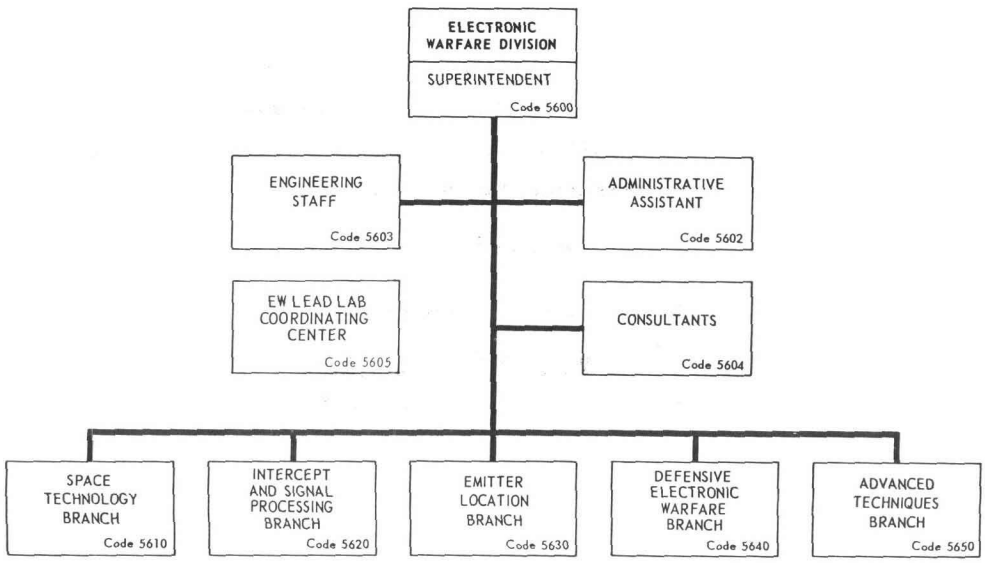
- E W LEAD LABORATORY COORDINATING CENTER
- SPACE TECHNOLOGY
- SIGNAL INTERCEPT AND SIGNAL PROCESSING
- EMITTER LOCATION
- DEFENSIVE ELECTRONIC WARFARE
- ADVANCED TECHNIQUES



150 FOOT ANTENNA
Sugar Grove



HF ANTENNA



Basic Responsibilities

The Electronic Warfare Division is responsible for the research and development required in support of the Navy's electronic warfare mission in the fields of space technology, intercept and signal processing, emitter location, and defensive electronic warfare, and it has responsibility associated with NRL's designation as EW Lead Laboratory for Navy in-house exploratory development.

Branches

Space Technology

- Large parabolic antenna systems
- Electromagnetic radiation observation
- Special media propagation
- Electromagnetic exosphere phenomena
- Satellite systems
- National radio quiet zone

Emitter Locations

- Direction finding
- Ionospheric research
- Propagation studies
- Infrared countermeasures
- Large antenna studies

Intercept and Signal Processing

- Interception
- Signal processing
- Data storage
- Data processing
- Recording
- Display

Defensive Electronic Warfare

- Deception techniques
- Jamming
- Electromagnetic reflectors
- Defensive systems

EW Lead Laboratory Staff

- Navy in-house exploratory development
- Program Reference Center
- Technical studies analysis and consultation
- Advanced Technical Objectives Work Group

Advanced Techniques

- Concept formulation
- New platform and mission considerations
- Signal processing devices
- Advanced detection and identification techniques
- New ECM techniques

Key Personnel

Name	*Title*
Mr. H. O. Lorenzen	Superintendent
CAPT F. Welden, USN (Ret)	Consultant
Mr. W. E. Withrow	Consultant
Dr. G. P. Ohman	EW Lead Laboratory Coordinator and Head, EW Lead Laboratory Staff
Mr. J. H. Trexler	Head, Space Technology Branch
Mr. R. D. Misner	Head, Intercept and Signal Processing Branch
Mr. M. J. Sheets	Head, Emitter Location Branch
Mr. A. J. Jesswein, Jr.	Head, Defensive Electronic Warfare Branch
Mr. L. A. Cosby	Head, Advanced Techniques Branch

Personnel Complement

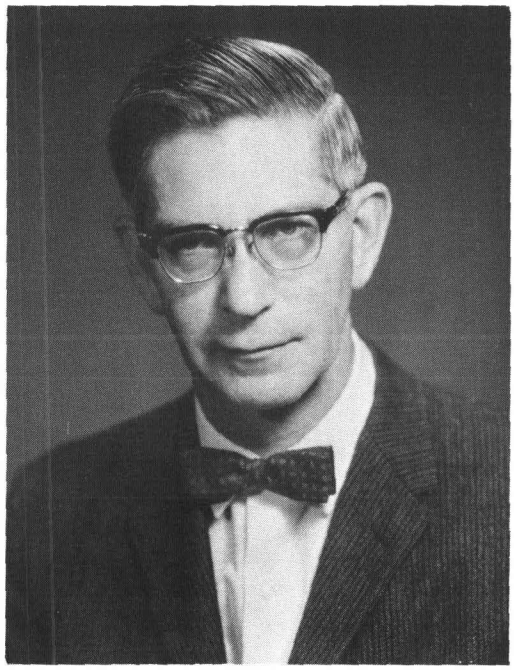
On Board: 125

Graded: 123
Ungraded: 2

Total Estimated R&D Funding

Fiscal Year 1971: $12,631,000

Materials Area



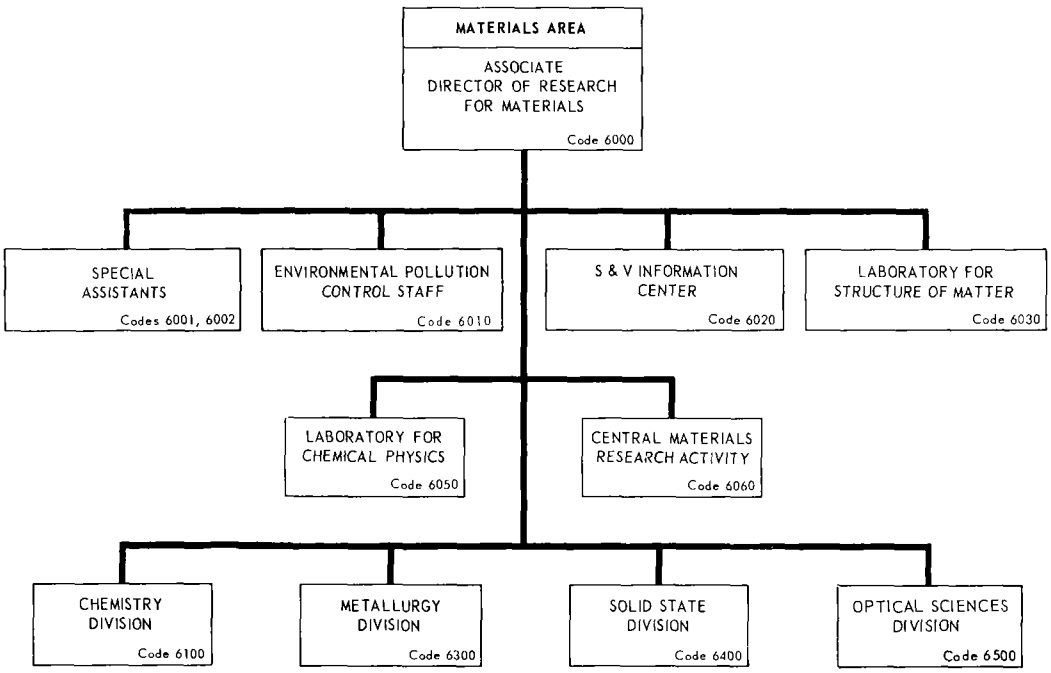
Dr. James H. Schulman
Associate Director of Research for Materials

Dr. Schulman [redacted]. He received the degrees of B.S. (1939) and Ph.D. (1942), both in chemistry, from the Massachusetts Institute of Technology. He has held teaching positions at Suffolk University and M.I.T. and research positions at the M.I.T. Laboratory for Insulation Research and Sylvania Electric Products.

Since coming to NRL in 1946 to initiate research on luminescence in solids, he has served as Head of Branches in the Metallurgy and Solid State Divisions and as Superintendent of the Optical Physics Division. From August 1960 until December 1961, he was Deputy Scientific Director of the London Branch of the Office of Naval Research. In November 1964, Dr. Schulman was appointed to the Chair of Materials Sciences in recognition of his distinguished research accomplishments. In September 1967, he was appointed Associate Director of Research for Materials.

Dr. Schulman received the Applied Science Award of the NRL Branch of the Research Society of America (1957) and the Navy Superior Civilian Service Award (1965), both in recognition of his many contributions to the science of luminescent materials and phenomena, radiation-induced optical effects in solids, and the application of these effects to radiation dosimetry. He is author or co-author of over 90 papers and a book on these subjects, and he holds numerous patents.

Dr. Schulman is a Fellow of the American Physical Society, the Optical Society of America, and the American Association for the Advancement of Science, as well as an Associate Editor of two scientific journals. He has served on several panels and committees of the National Academy of Sciences and of various scientific societies.



Key Personnel

Dr. J. H. Schulman	Associate Director of Research for Materials
Dr. D. A. Patterson	Special Assistant
Dr. H. Gandy	Special Assistant
Mr. V. R. Piatt	Environmental Pollution Controller Officer
Dr. W. W. Mutch	Head, S&V Information Center
Dr. J. Karle	Head, Laboratory for Structure of Matter
Dr. W. A. Zisman	Head, Laboratory for Chemical Physics
Mr. R. J. Ginther	Head, Central Materials Research Activity
Dr. R. E. Kagarise	Superintendent, Chemistry Division
Mr. W. S. Pellini	Superintendent, Metallurgy Division
Dr. C. C. Klick	Superintendent, Solid State Division
Dr. W. R. Sooy	Superintendent, Optical Sciences Division

ENVIRONMENTAL POLLUTION CONTROL STAFF

Basic Responsibilities

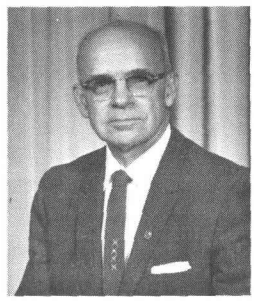
The Environmental Pollution Control Staff reviews current and projected programs and plans to identify present and potential sources of pollution at NRL, recommends preventative or corrective measures necessary to reduce or eliminate pollution, prepares and issues standards, directives, and publicity in this field, and conducts research related to the control of pollution.

Key Personnel

Mr. V. R. Piatt — Environmental Pollution Control Officer

Personnel Complement

On Board: 4



Mr. V. R. Piatt

SHOCK & VIBRATION INFORMATION CENTER

Basic Responsibilities

The Shock & Vibration Information Center is one of the Information Analysis Centers established by the Director of Technical Information, ODDR&E. It is assigned to the Navy for management and operation. It provides a single source within the Department of Defense for up-to-date information in the fields of shock and vibration for scientists and engineers in government agencies and for government contractors.

Key Personnel

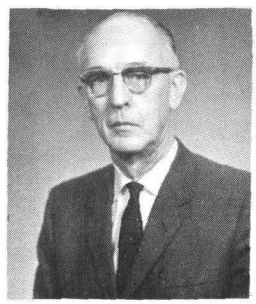
Dr. W. W. Mutch — Head, S&V Information Center

Personnel Complement

On Board: 5

Total Estimated R&D Funding

Fiscal Year 1971: $220,000



Dr. W. W. Mutch

LABORATORY FOR STRUCTURE OF MATTER

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of x-ray, electron, and neutron diffraction are used in a broad program of structure studies which can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines.

Key Personnel

Dr. J. Karle — Head, Laboratory for Structure of Matter

Personnel Complement

On Board: 12

Total Estimated R&D Funding

Fiscal Year 1971: $525,000

Dr. J. Karle

LABORATORY FOR CHEMICAL PHYSICS

Basic Responsibilities

The Laboratory for Chemical Physics carries out an interdisciplinary program of fundamental and applied research with especial emphasis on phenomena occurring at phase boundaries, i.e., the interfaces between solids and solids, solids and liquids, solids and gases, liquids and liquids, and liquids and gases. Currently, attention is being given to adhesion and adhesion promoters, wetting, surface electric properties of metals and plastics, interfacial phenomena in composite materials, the quantitative relation of dry film lubricants to shear strength and its pressure coefficient, the ability of insoluble monolayers to dampen the surface waves in liquids, and the relation of the interfacial tension of two liquids to their solubility.

Key Personnel

Dr. W. A. Zisman	Head, Laboratory for Chemical Physics

Personnel Complement

On Board: 10

Total Estimated R&D Funding

Fiscal Year 1971: $301,000

Dr. W. A. Zisman

CENTRAL MATERIALS RESEARCH ACTIVITY

Basic Responsibilities

The responsibilities of the Central Materials Research Activity are twofold: (1) to perform basic and applied research in the preparation and characterization of materials, and (2) to provide consultation or assistance for all laboratory research personnel in the above matters. Special research areas investigated by the staff include glasses, luminescent materials, and single-crystal high-purity and rare earth materials. The primary means involved in characterization are wet chemical analysis, x-ray fluorescent and electron beam microprobe analysis, emission and solid state spark source spectrometry, electron microscopy, and x-ray diffraction techniques.

Key Personnel

Mr. R. J. Ginther	Head, Central Materials Research Activity
Mr. D. I. Walter	Head, Analytical Chemistry Branch
Mr. R. J. Ginther	Head, Structure and Composition Branch

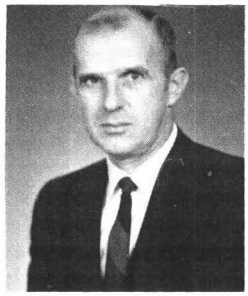
Personnel Complement

On Board: 28

Total Estimated R&D Funding

Fiscal Year 1971: $861,900

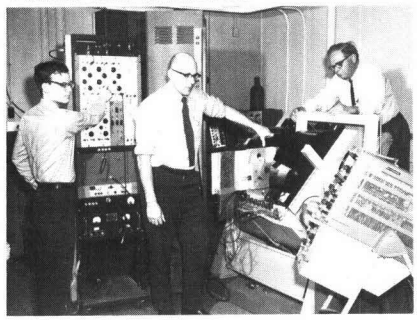
Mr. R. J. Ginther



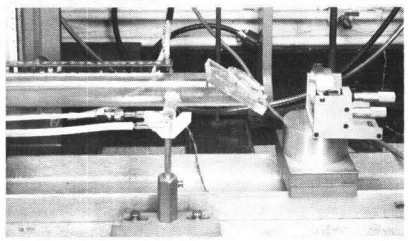
Chemistry Division

Dr. R. E. Kagarise

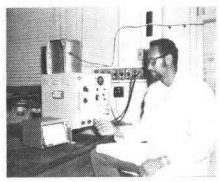
PULSED-NMR APPARATUS



CHEMICAL LASER

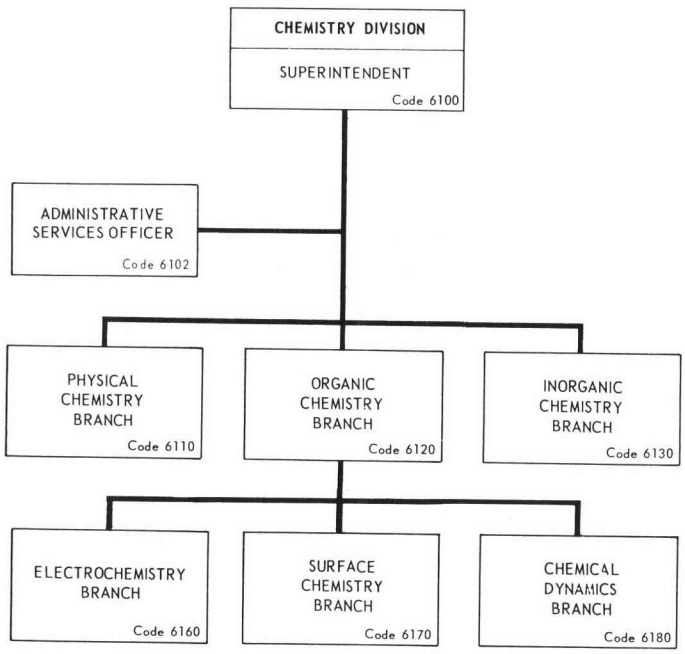


- PHYSICAL CHEMISTRY
- ORGANIC CHEMISTRY
- INORGANIC CHEMISTRY
- ELECTROCHEMISTRY
- SURFACE CHEMISTRY
- CHEMICAL DYNAMICS



TOTAL HYDROCARBON ANALYZER

AQUEOUS FILM-FORMING FOAM



Basic Responsibilities

The Chemistry Division conducts a diversified program of basic and applied research and development in physical, organic, inorganic, and analytical chemistry. Specialized programs within these fields include fuels, lubricants, corrosion, surface chemistry, fire suppression, protective coatings, polymers, electrochemistry, molecular structure, chemical lasers, submarine atmosphere purification, and BW/CW personnel protection. Consultative services form an important element in the division effort.

Branches

Physical Chemistry

- Infrared and ultraviolet spectroscopy
- Analytical mass spectrometry
- Nuclear magnetic resonance spectroscopy
- Chemical lasers

Organic Chemistry

- Synthesis and properties of polymers
- Functional organic coatings
- Properties of resins under high compressive loads

Inorganic Chemistry

- Submarine air purification
- Reaction mechanisms
- Corrosion mechanisms and kinetics
- Ceramic materials

Electrochemistry

- Fuel cells
- Fundamental electrode reactions
- Electrochemical power sources

Surface Chemistry

- Lubricants
- Salvage of equipment damaged by sea water
- Surface properties of fibers
- Drag reduction
- Adsorbents
- Surface and solid kinetics

Chemical Dynamics

- Organic contaminants in submarine atmosphere
- Distillate fuels research
- Autoxidation and combustion dynamic
- Fire suppression
- CW/BW ship defense

Key Personnel

Name	*Title*
Dr. R. E. Kagarise	Superintendent
Dr. L. B. Lockhart, Jr.	Head, Physical Chemistry Branch
Dr. A. L. Alexander	Head, Organic Chemistry Branch
Mr. R. R. Miller	Head, Inorganic Chemistry Branch
Dr. J. C. White	Head, Electrochemistry Branch
Dr. N. L. Jarvis	Head, Surface Chemistry Branch
Dr. H. W. Carhart	Head, Chemical Dynamics Branch

Personnel Complement

On Board: 117

Total Estimated R&D Funding

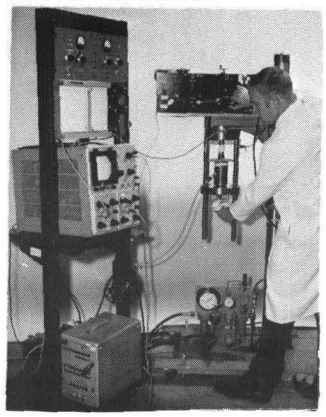
Fiscal Year 1971: $4,334,000

Metallurgy Division

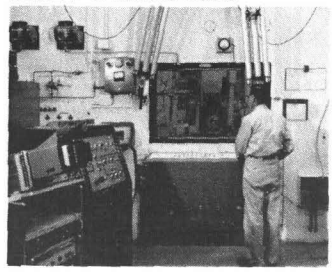
Mr. W. S. Pellini

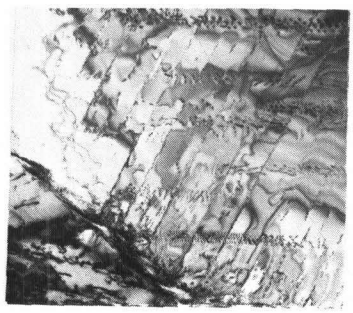
- PHYSICAL METALLURGY
- METAL PHYSICS
- THERMOSTRUCTURAL MATERIALS
- TRANSFORMATIONS AND KINETICS
- STRENGTH OF METALS
- REACTOR MATERIALS

FRACTURE MECHANICS

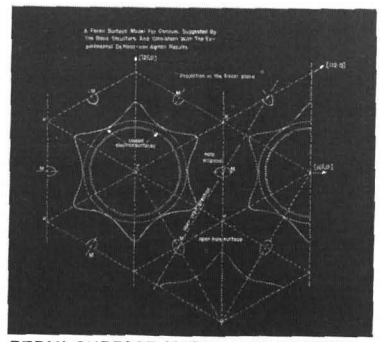


REMOTE HANDLING ROOM

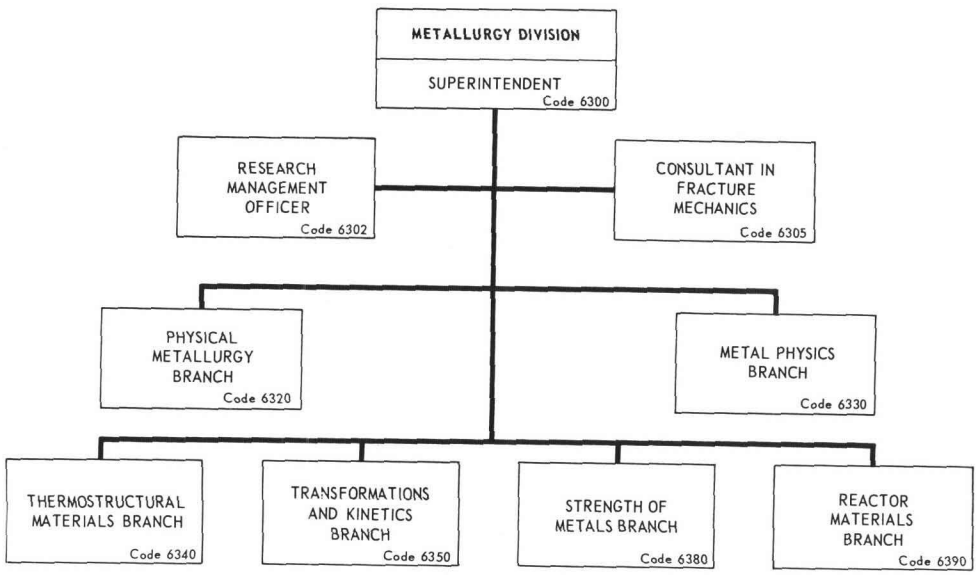




COPLANAR SLIP: S.C.C. IN Ti ALLOYS



FERMI SURFACE MODEL FOR OSMIUM



Basic Responsibilities

The Metallurgy Division is concerned with basic and applied research in physical, mechanical, chemical, and structural aspects of metals. Metal physics activities center in the investigation of electronic transport properties in terms of quantum-mechanical principles. The mechanical studies are largely related to the attainment of quantitative analytical capabilities in the definition of plastic flow and fracture properties. The chemical interests involve electrochemical aspects of various forms of catastrophic corrosion, particularly the complex phenomenon of stress corrosion cracking. The metal structure studies cover a broad range of topics including strengthening mechanisms, role of defect structures, microscale separation events in fracture, transformation processes, and mechanisms of environmental effects. This broad range of activity evolves from a balanced staff which includes materials scientists, physical metallurgists, physicists, chemists, and mechanical engineers. Important consultative services on subjects ranging from concept formulation to system development are provided to the Navy and other DoD activities.

Branches

Physical Metallurgy

- Micromechanical metallurgy
- Corrosion science related to advanced alloys
- Marine corrosion

Metal Physics

- Fermi surface studies of pure metals and alloys
- Electronic, magnetic, and optical properties of metallic materials
- Charged particle irradiation effects
- Thermal and optical properties of metals at elevated temperatures

Thermostructural Materials

- Metal ceramic composites
- Interface bonding and reactions kinetics
- Phase diagram and crystal structure analysis
- Defect structure relationships to diffusional processes

Transformations and Kinetics

- Solidification and crystal growth
- Thermodynamics of lattice vacancies and dislocations
- Holographic applications to metallurgical studies
- Crystal plasticity

Strength of Metals

- Characterization criteria
- Fracture-Safe design parameters
- Role of processing for high strength metals
- Macroscale and microscale aspects of metal separation processes

Reactor Materials

- Environmental factors in neutron irradiation
- Basic mechanisms of radiation damage
- Spectral analyses and dosimetry
- Characterization criteria for mechanical damage

Key Personnel

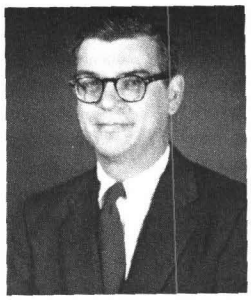
Name	*Title*
Mr. W. S. Pellini	Superintendent
Dr. J. M. Krafft	Consultant
Dr. B. F. Brown	Head, Physical Metallurgy Branch
Dr. A. I. Schindler	Head, Metal Physics Branch
Dr. R. A. Meussner	Head, Thermostructural Materials Branch (Acting)
Dr. M. E. Glicksman	Head, Transformations and Kinetics Branch
Mr. R. J. Goode	Head, Strength of Metals Branch
Mr. L. E. Steele	Head, Reactor Materials Branch

Personnel Complement

On Board: 95

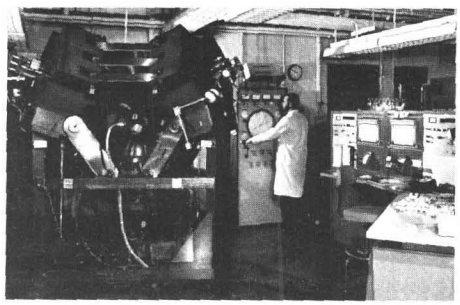
Total Estimated R&D Funding

Fiscal Year 1971: $3,347,000



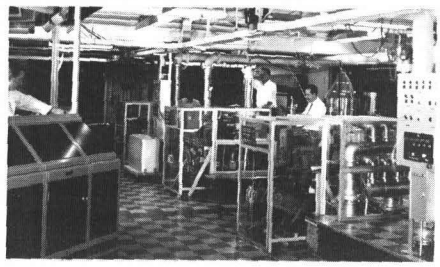
Dr. C. C. Klick

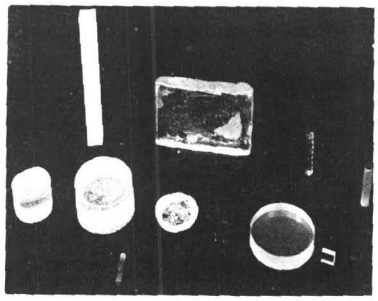
Solid State Division



TETRAHEDRAL PRESS AND X-RAY EQUIPMENT

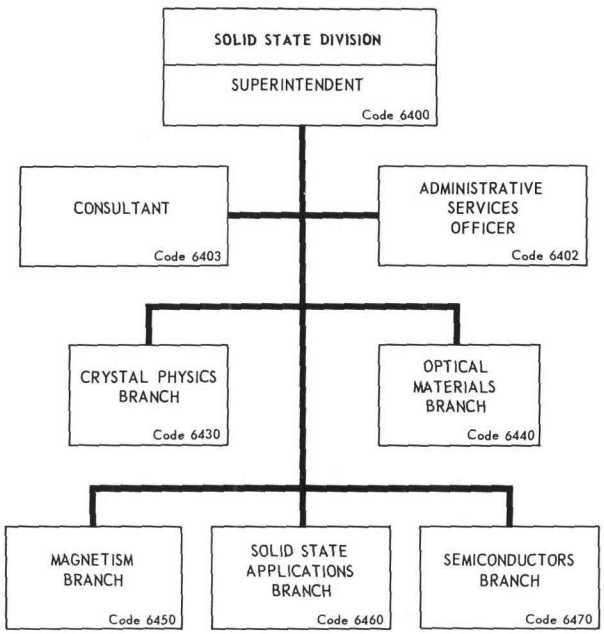
HIGH MAGNETIC FACILITY





LUMINESCENT PROPERTIES OF GLASS

- CRYSTAL PHYSICS
- OPTICAL MATERIALS
- MAGNETISM
- SOLID STATE APPLICATIONS
- SEMICONDUCTORS



Basic Responsibilities

The Solid State Division is concerned with basic and applied research in the physics of materials, principally solids, and with the interaction of matter with radiation. Its purposes are to increase understanding of the physical principles involved, to pursue applications related to military and industrial problems, and to serve as a corps of experts in solids for the Laboratory specifically and the Navy generally. The research work of the Division is fairly comprehensive in magnetism, semiconductors, and alkali halides. Important work is also carried on in surface physics, structure, and optical properties of glass, properties of metals at low temperatures and high magnetic fields, the effects of high pressures on solids, and radiation damage. Applications in solid state dosimeters, semiconductor photovoltaic cells, information storage systems, and infrared detectors are being pursued actively.

Branches

Crystal Physics

- High-pressure effects
- Ferroelectric materials

Optical Materials

- Electronic properties of nonmetal crystals and glasses
- Radiation induced defects, color centers
- Lattice dynamics

Magnetism

- Electronic and nuclear paramagnetism
- Spin-ordered magnetic phenomena
- Magnetism and superconductivity at ultra-low temperatures

Solid State Applications

- Environmental effects on semiconductor and dielectric materials and devices

Semiconductors

- Electronic energy levels and band structure
- Semiconductor applications
- Physical properties of semiconductors
- Cryomagnetism
- Lattice Vibrations
- IR detectors
- IR light sources such as semiconductor lasers

Key Personnel

Name	*Title*
Dr. C. C. Klick	Superintendent
Mr. J. R. Clement	Associate Superintendent (Acting)
Mr. J. R. Clement	Consultant
Dr. P. B. Alers	Head, Crystal Physics Branch
Dr. M. N. Kabler	Head, Optical Materials Branch
Dr. G. T. Rado	Head, Magnetism Branch
Dr. B. J. Faraday	Head, Solid State Applications Branch (Acting)
Dr. S. Teitler	Head, Semiconductors Branch (Acting)

Personnel Complement

On Board: 93

Total Estimated R&D Funding

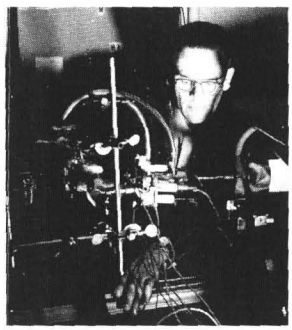
Fiscal Year 1971: $3,250,000

Dr. W. R. Sooy

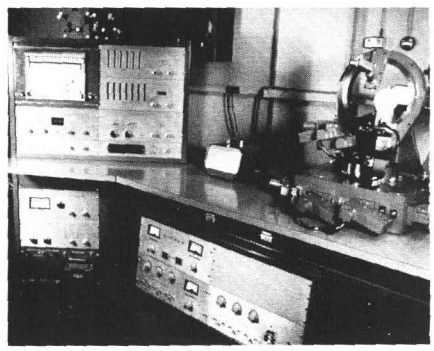
Optical Sciences Division

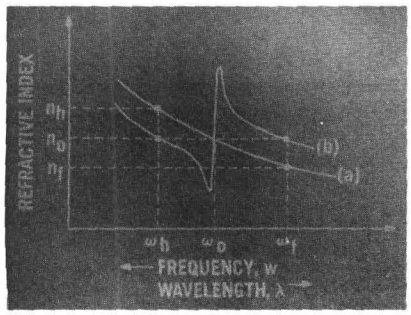
- QUANTUM OPTICS
- APPLIED OPTICS
- LASER PHYSICS
- OPTICAL WARFARE

GLASS LASER



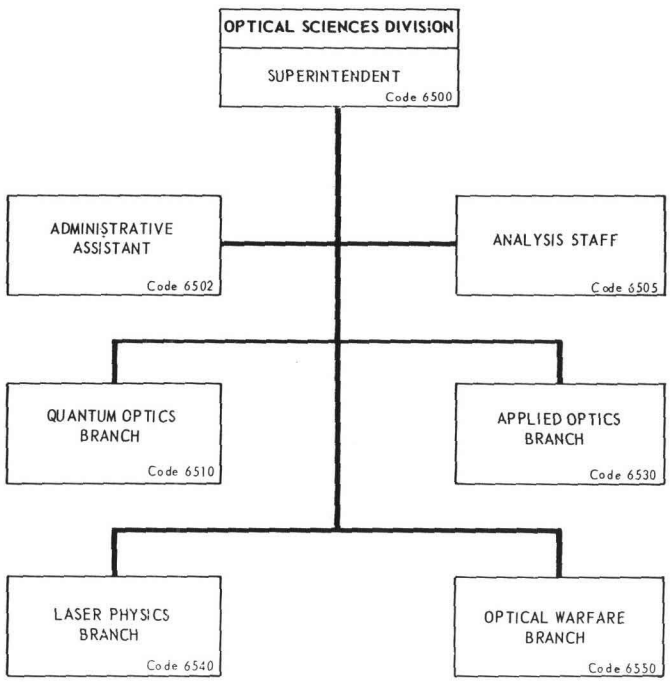
AUTOMATIC X-RAY DEFRACTOMETER





PHASE MATCHING IN NONLINEAR OPTICS

TILGHMAN ISLAND



Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near ultraviolet and far infrared. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities including systems analysis and prototype system development and exploitation of research and development for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, chemical, electrical and solid state laser physics, infrared physics, atmospheric propagation, optical technology, hydrological optics, holography, optical warfare, optical radar, and optical systems. A variety of field measurement programs on optical problems of specific interest are also conducted.

Staff Activity

Analysis Staff

Systems Analysis
Operations Analysis
Special Studies
Consultative Service

Branches

Quantum Optics

Nonlinear optical phenomena
EMR interactions in matter
Laser action and devices
Optical parametric oscillators
Optical Up-conversion
Quantum effects in materials

Laser Physics

Molecular laser physics
Chemical laser physics

Applied Optics

Atmospheric optics
IR characteristics of military targets
Optical communications
Optical information processing
IR laser technology

Optical Warfare

Optical radar
Optical and IR countermeasures
Optical information gathering
Optical and electrooptical techniques

Key Personnel

Name	*Title*
Dr. W. R. Sooy	Superintendent
Dr. L. F. Drummeter, Jr.	Associate Superintendent
Dr. H. Rabin	Head, Quantum Optics Branch
Dr. H. Shenker	Head, Applied Optics Branch
Mr. W. Graham	Head, Laser Physics Branch (Acting)
Dr. W. R. Sooy	Head, Optical Warfare Branch (Acting)

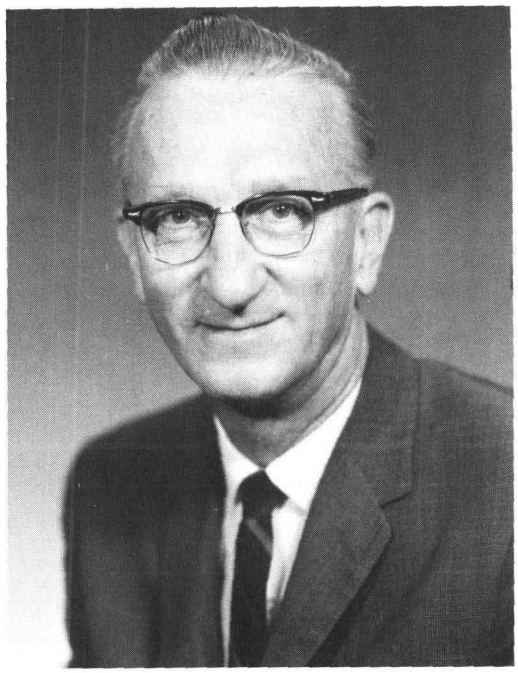
Personnel Complement

On Board: 75

Total Estimated R&D Funding

Fiscal Year 1971: $3,266,000

General Sciences Area

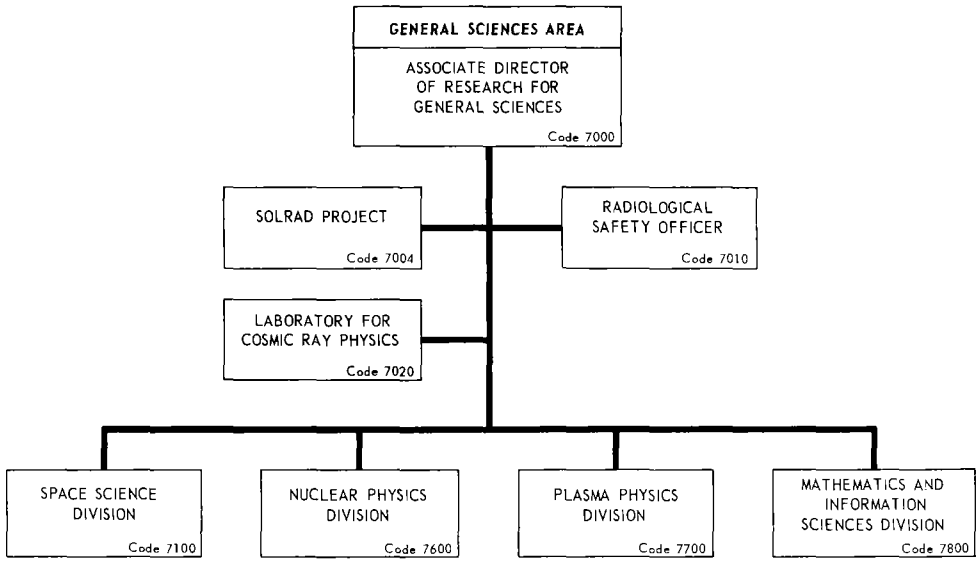


Dr. Wayne C. Hall
Associate Director of Research for General Sciences

Dr. Hall [redacted]. He attended the University of Kansas, receiving a B.S.E.E. in 1931, an M.S. in physics in 1933, and a Ph.D. in physics in 1936.

Dr. Hall came to the Laboratory in 1935 for research on the use of fuel cells to effect direct conversion of heat energy. During the next ten years he was also involved in studies on electronic strain gages, torsion meters, and static electricity. His work on precipitation static interference to aircraft radio communications ultimately led to development of the first antiprecipitation static devices used on aircraft to improve the reliability of radio communications and radio navigational aids during severe weather conditions and to reception of the Distinguished Civilian Service Award.

In 1946 Dr. Hall was appointed Superintendent of the Aircraft Electricity Division, subsequently the Solid State Division. In addition, from 1948 through 1951 he was Scientific Officer of a Los Alamos Scientific Laboratory project involving diagnostic measurements in the atomic weapons program. He was appointed Associate Director of Research in July 1954.



Key Personnel

Dr. W. C. Hall	Associate Director of Research for General Sciences
Mr. E. W. Peterkin	Technical Project Manager
Mr. L. A. Brauch	Radiological Safety Officer
Dr. M. M. Shapiro	Head, Laboratory for Cosmic Ray Physics
Dr. H. Friedman	Superintendent, Space Science Division
Dr. E. A. Wolicki	Superintendent, Nuclear Physics Division
Dr. R. A. Shanny	Superintendent, Plasma Physics Division (Acting)
Dr. P. B. Richards	Superintendent, Mathematics & Information Sciences Division

LABORATORY FOR COSMIC RAY PHYSICS

Basic Responsibilities

The Laboratory for Cosmic Ray Physics conducts a program of fundamental investigations of cosmic radiation–its composition and spectra, its origin, its "age," its propagation through space, its interactions with particles and fields in the regions of space that it traverses, and its role in various astrophysical phenomena. The program is framed so as to be broadly responsive to the anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

Name	*Title*
Dr. M. M. Shapiro	Chief Scientist
Mr. B. Stiller*	Head, Charged Particles (Section A)
Mr. N. Seeman	Head, Gamma Rays (Section B)
Dr. R. Silberberg	Senior Scientist
Mr. F. W. O'Dell	Senior Scientist

Dr. M. M. Shapiro

Personnel Complement

On Board: 20

Total Estimated R&D Funding

Fiscal Year 1971: $667,000

*Until 25 July 1970.

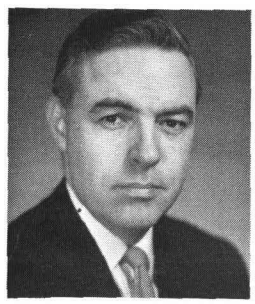
SOLRAD PROJECT

Basic Responsibilities

The SOLRAD Project was established to support NAVAIR exploratory development tasks in solar x-ray monitoring, and specifically to (1) develop, construct, test, evaluate, and provide launch support of SOLRAD satellites, (2)track, command, and acquire satellite telemetry, and (3) reduce, analyze, and transmit solar emission data for scientific and application purposes.

Key Personnel

Name	*Title*
Mr. E. W. Peterkin	Technical Project Manager
Mr. R. W. Kreplin	Scientific Program Manager
Mr. C. H. Chrisman	Assistant Manager for Data Processing
Mr. P. W. Wilhelm	Assistant Manager for Space Craft
Mr. G. E. Leavitt	Technical Assistant for Experiments Electronics



Mr. E. W. Peterkin

Manpower Support: 40 Man-years

Total Estimated R&D Funding

Fiscal Year 1971: $2,900,000

RADIOLOGICAL SAFETY OFFICE

Basic Responsibilities

The Health Physics Staff is assigned the overall responsibility for radiological safety at the Naval Research Laboratory and acts, as requested, as representative of the Office of Naval Research in radiological safety matters. The NRL radiological safety program has three primary purposes: (1) to assure that all operations using ionizing radiation are safe and in compliance with Federal Regulations; (2) to provide employees with instruments, instructions, and assistance to assure radiation safety in the performance of their duties; and (3) to conduct research in radiation dosimetry, instrumentation, and methodology.

Key Personnel

Name	*Title*
Mr. L. A. Brauch	Radiological Safety Officer
Mr. R. L. Flournoy	Senior Health Physicist
Mr. T. L. Johnson	Head, Research Section
Mr. J. N. Stone	Head, Operations Section
Mr. R. B. Luersen	Head, Accelerators and Analysis Section

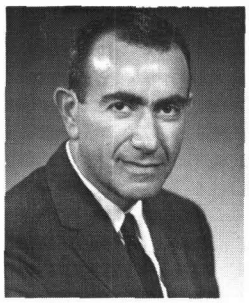
Mr. L. A. Brauch

Personnel Complement

On Board: 19

Total Estimated R&D Funding

Fiscal Year 1971: $365,000



Space Science Division

Dr. H. Friedman

UPPER AIR PHYSICS
RADIO ASTRONOMY
ROCKET SPECTROSCOPY

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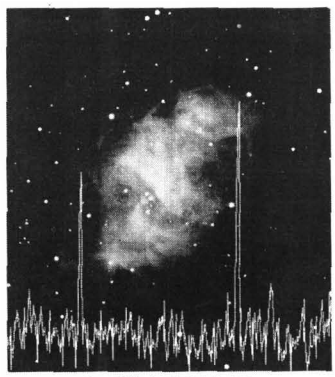
E. O. HULBURT CENTER
FOR SPACE RESEARCH



X-RAY PULSAR IN THE CRAB NEBULA

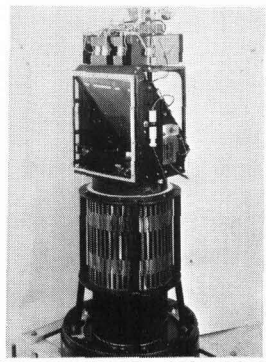
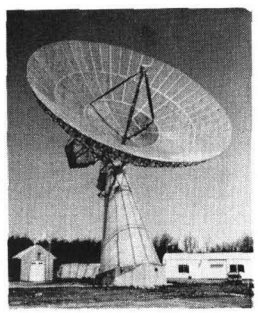
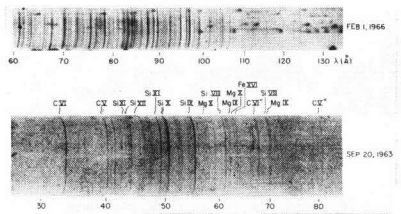


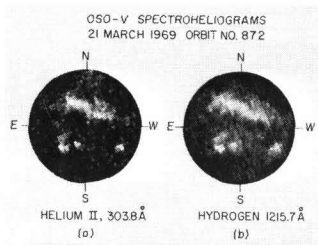
IMAGE-CONVERTER SPECTROGRAPH FOR FAR-UV ROCKET ASTRONOMY

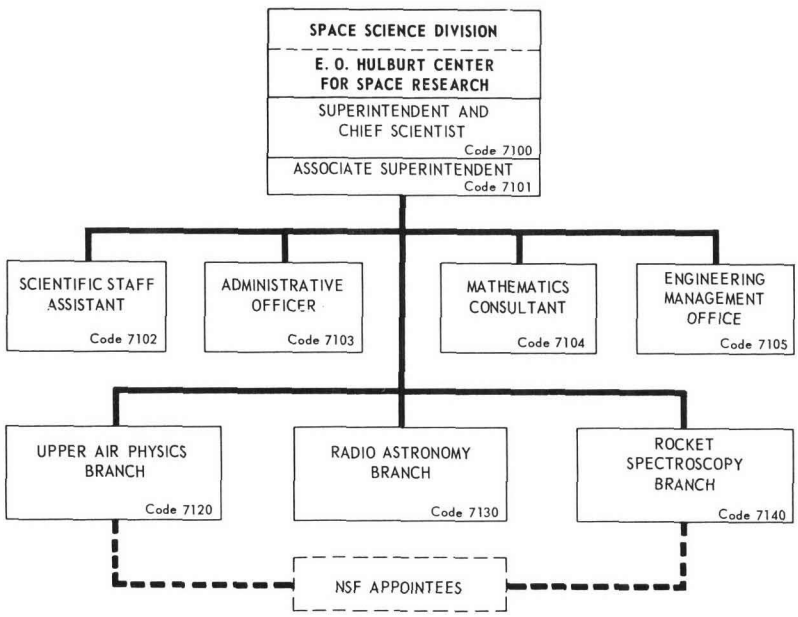


RADIO TELESCOPE MARYLAND POINT



X-RAY SPECTRUM OF THE SUN





Basic Responsibilities

The Space Science Division conducts research, development, and tests in the fields of upper air physics, astronomy, and astrophysics. Satellites and rockets are used to obtain information on radiation from the sun and celestial sources, and to study the composition and behavior of the ionosphere. Radio telescopes are used for astronomical observations. Results are of importance to radio communications, to utilization of the space environment, and to the fundamental understanding of natural radiation phenomena.

Branches

Upper Air Physics

- Gamma-ray, x-ray, ultraviolet, and infrared astronomy
- Aeronomy
- Solar x-ray monitoring satellites
- Electronic imaging studies
- Meteor astronomy

Radio Astronomy

- Galactic and extragalactic radio astronomy
- Radar measurements of earth-moon distance and topography of moon
- Radar and microwave applications to oceanography

Rocket Spectroscopy

- X-ray and ultraviolet solar spectroscopy
- Spectroheliographic and coronagraphic research
- Laboratory astrophysics
- XUV spectroradiometry
- Apollo telescope mission solar research

E. O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and post-graduate students and visiting faculty members to cooperate with NRL in space research.

Key Personnel

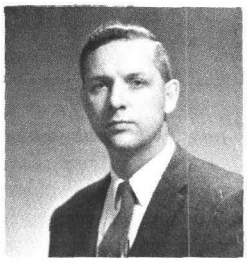
Name	*Title*
Dr. H. Friedman	Superintendent
Dr. P. Mange	Associate Superintendent
Dr. B. Lepson	Mathematics Consultant
Dr. T. A. Chubb	Head, Upper Air Physics Branch
Mr. C. H. Mayer	Head, Radio Astronomy Branch
Dr. R. Tousey	Head, Rocket Spectroscopy Branch
Dr. H. Friedman	Chief Scientist, Hulburt Center

Personnel Complement

On Board: 132

Total Estimated R&D Funding

Fiscal Year 1971: $12,411,000

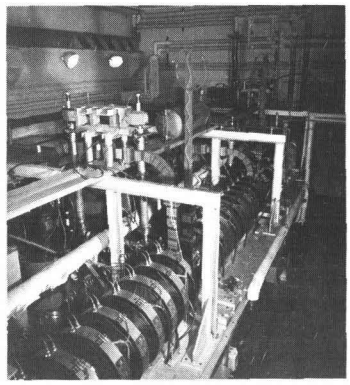


Dr. E. A. Wolicki

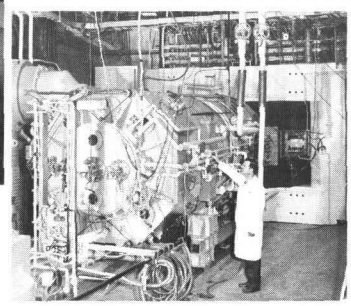
Nuclear Physics Division

- CYCLOTRON
- LINAC
- NUCLEAR SYSTEMS
- REACTORS
- THEORY
- VAN DE GRAAFF
- X-RAY OPTICS

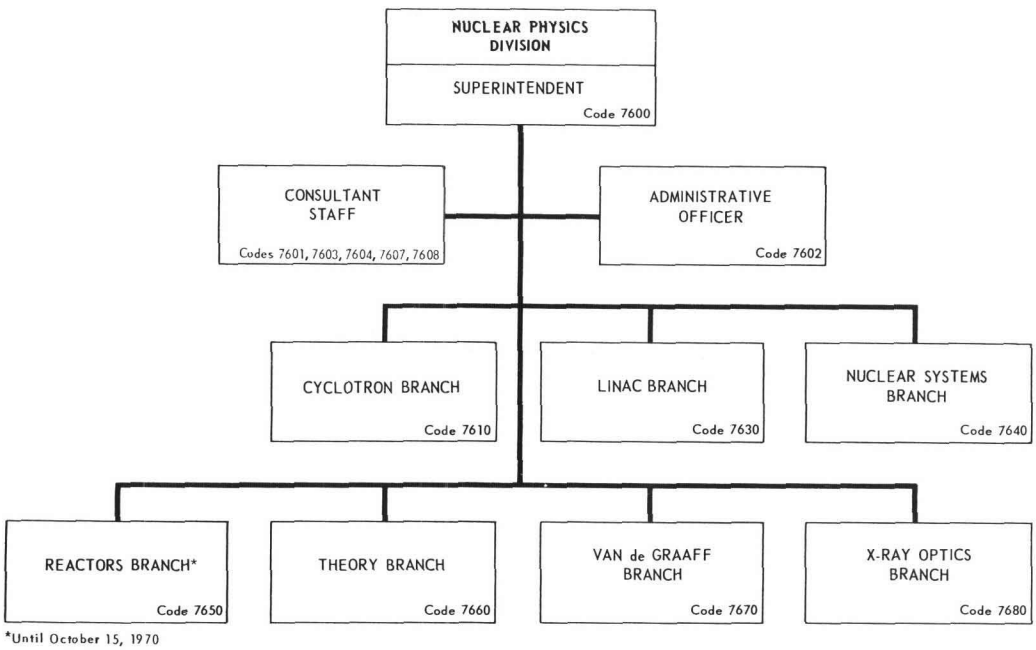
LINAC



VAN DE GRAAFF



CYCLOTRON



*Until October 15, 1970

Basic Responsibilities

The Nuclear Physics Division is engaged in a broad program of basic and applied research in nuclear physics and related areas. Included are theoretical and experimental programs in properties of nuclei, nuclear forces, nuclear reactions, shielding studies, x-ray and electron optics, materials analysis, and nuclear-weapon-related research. The Division operates a 75-MeV sector focussing cyclotron, 60-MeV Linac, 5-MeV Van de Graaff, and other particle accelerators and radiation sources.

Branches

Cyclotron

- Charged particle nuclear reactions
- Nuclear structure
- Charged particle scattering
- Neutron shielding
- Radioactivation analysis
- Production of radioactive sources

Linac

- Electron scattering
- Photonuclear reactions
- Nuclear excitation
- Neutron capture reactions
- Pulsed radiation effects
- Radioactivation analysis
- Service irradiations

Nuclear Systems

- Low-level nuclear radiation detectors for special purposes
- Development of instruments for nuclear safeguards and radiac instrumentation

Reactors

(Disestablished October 15, 1970)

Theory

- Coherent bremsstrahlung
- Electron scattering by nuclei
- Nuclear reactions
- Nuclear structure
- Nucleon-nucleon interactions
- Fundamental quantum-mechanical scattering theory
- High-intensity laser propagation

Van de Graaff

- Materials analysis by means of charged particle beams
- Implantation of ions into solids
- Radiation effects caused by high energy charged particle beams
- Crystal studies by means of particle channeling techniques

X-Ray Optics

- X-ray spectral measurements
- X-ray fluorescence analysis
- Electron probe micro-analysis

Key Personnel

Name	*Title*
Dr. E. A. Wolicki	Superintendent (Acting)
Dr. J. McElhinney	Superintendent (After October 1970)
Dr. E. A. Wolicki	Consultant (After October 1970)
Dr. C. V. Strain	Consultant
Mr. F. H. Attix	Consultant
Dr. J. W. Butler	Consultant
Dr. R. O. Bondelid	Head, Cyclotron Branch
Dr. T. F. Godlove	Head, Linac Branch
Mr. D. C. Cook	Head, Nuclear Systems Branch
Dr. K. W. Marlow	Head, Reactors Branch (To October 15, 1970)
Dr. A. W. Sáenz	Head, Theory Branch
Dr. K. L. Dunning	Head, Van de Graaff Branch
Mr. L. S. Birks	Head, X-Ray Optics Branch

Personnel Complement

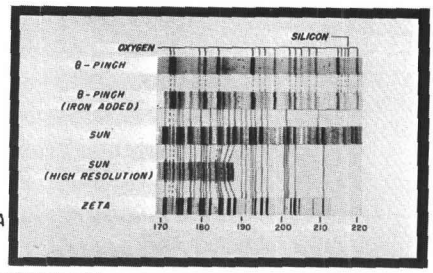
On Board: 113

Total Estimated R&D Funding

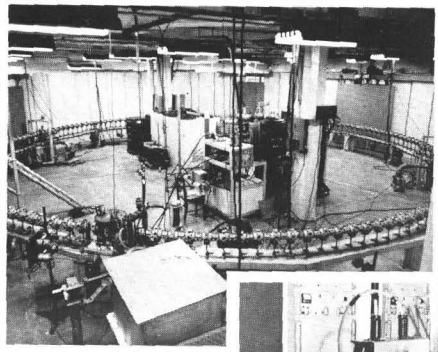
Fiscal Year 1971: $3,321,300

Dr. R. A. Shanny

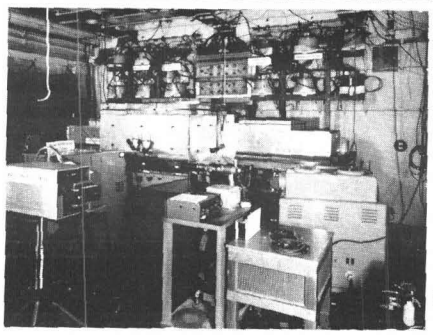
Plasma Physics Division



STAR vs. LAB SPECTRA

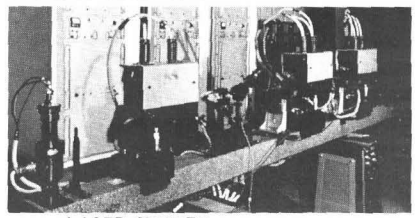


SOZOTRON

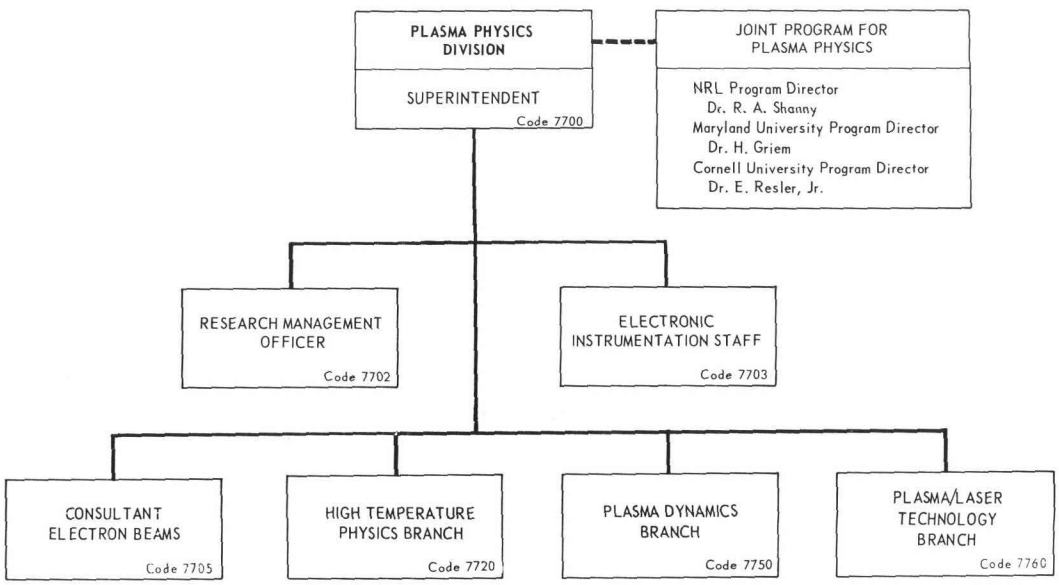


- HIGH TEMPERATURE PHYSICS
- PLASMA DYNAMICS
- PLASMA/LASER TECHNOLOGY

θ-PINCH FACILITY



LASER STUDIES



Basic Responsibilities

The Plasma Physics Division conducts both basic and applied experimental and theoretical research. Examples of effort underway include: fusion physics and the generation and containment of high-temperature plasmas, directed toward eventual power sources; laboratory astrophysics; electron beams; collision-free shock waves; laser-produced plasma and high-power lasers. This Division, the University of Maryland, and Cornell University engage in a joint program of research in plasma physics. In addition to increasing significantly the scientific breadth of the participating institutions, the program is acquainting graduate students with research frontiers in plasma physics through association with leading scientists in the field. Students have an opportunity to use NRL facilities and talent for thesis research, and NRL scientists, in turn, are able to use the research facilities of both universities.

Branches

Electronic Instrumentation

- Instrumentation support to the Division for control measurement of experiments

High Temperature Physics

- Physics and utilization of ultra-high-temperature plasmas
- Plasma chemistry

Plasma Dynamics

- Theoretical and numerical simulation studies of problems in nonlinear plasma dynamics

Plasma/Laser Technology

- Production and applications of intense electron beams
- Beam stabilization
- Technological support to the Division in the form of electrical, mechanical, optical, and vacuum systems
- Research and development on high power solid state lasers
- Physics of plasma light sources

Key Personnel

Name	*Title*
Dr. R. A. Shanny	Superintendent (Acting)
Mr. J. D. Shipman	Head, Electronic Instrumentation Staff
Mr. D. C. dePackh	Consultant (Electron Beams)
Dr. R. C. Elton	Head, High Temperature Physics Branch
Dr. R. A. Shanny	Head, Plasma Dynamics Branch (Acting)
Dr. J. Emmett	Head, Plasma/Laser Technology Branch (Acting)

Personnel Complement

On Board: 75

Total Estimated R&D Funding

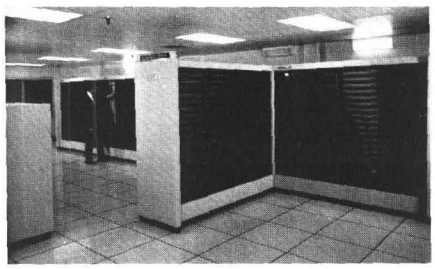
Fiscal Year 1971: $6,000,000

Dr. P. B. Richards

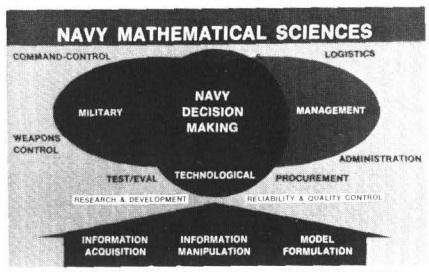
Mathematics and Information Sciences Division

- RESEARCH COMPUTATION CENTER
- INFORMATION SYSTEMS
- MATHEMATICS RESEARCH CENTER

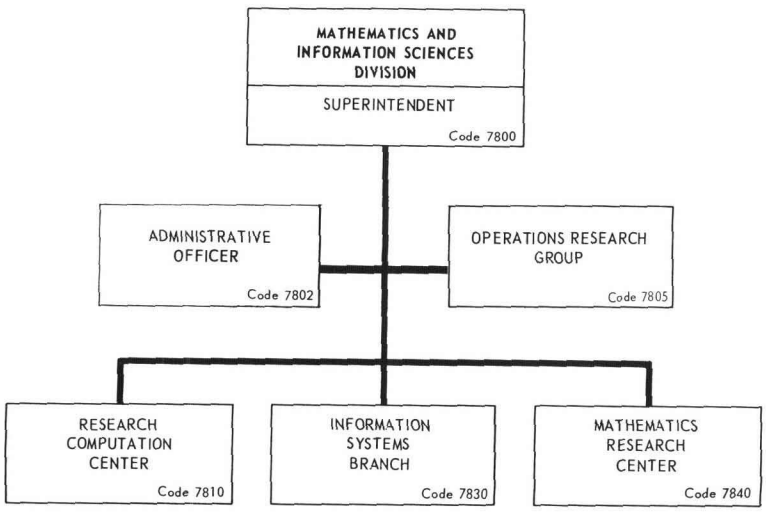
RESEARCH COMPUTATION CENTER



CDC 3800 COMPUTER



MATHEMATICS SCIENCE COORDINATION



Basic Responsibilities

The Mathematics and Information Sciences Division conducts basic and applied research in the mathematical sciences; determines present and future Navy needs with reference to mathematics and the computer-oriented sciences; and creates and maintains the competence required to formulate and to meet these needs.

Branches

Operations Research

- Resource allocation
- Inventory and logistics
- Weapons system evaluation

Information Systems

- Surveillance and intelligence
- Engineering applications
- Computer science
- Information system development

Research Computation

- Data engineering and operations
- Analog computer
- Programming
- Programming systems
- Information retrieval

Mathematics Research Center

- Functional analysis
- Ordinary and partial differential equations
- Special functions
- Approximation theory
- Functions of a complex variable
- Diophantine approximations
- Stochastic processes
- Control theory
- Numerical methods

Key Personnel

Name	*Title*
Dr. P. B. Richards	Superintendent
Dr. P. B. Richards	Head, Operations Research Group (Acting)
Mr. A. B. Bligh	Head Research Computation Center
Dr. B. Wald	Head, Information Systems Branch
Dr. P. B. Richards	Head, Mathematics Research Center (Acting)

On Board: 80

Total Estimated R&D Funding

Fiscal Year 1971: $950,000

Oceanology Area

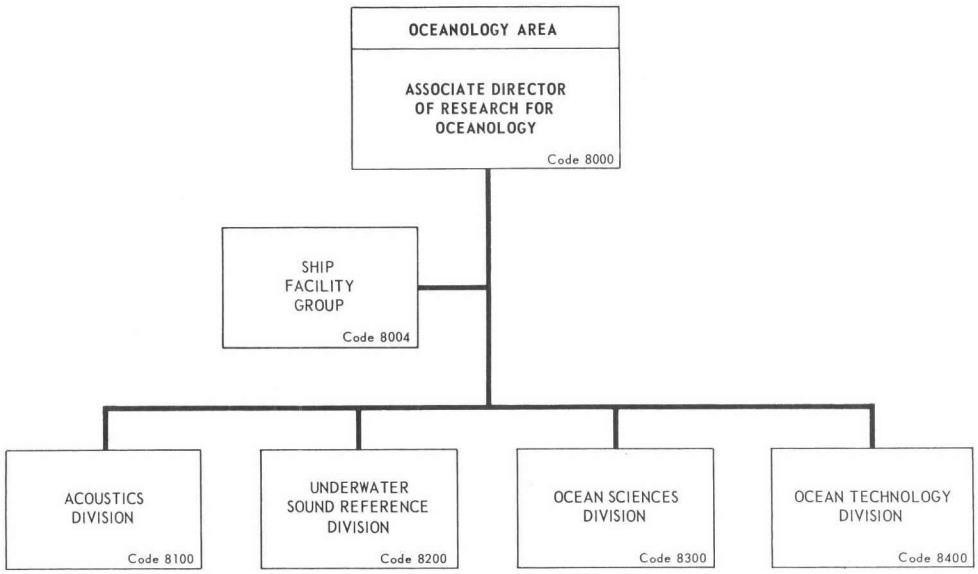
Dr. Ralph R. Goodman
Associate Director of Research for Oceanology

Dr. Goodman was born in Detroit, Michigan, on March 18, 1927. He attended the University of Michigan, Ann Arbor, where in 1950 he received a B.S. degree in mathematics, in 1951 a B.S. in physics, in 1952 an M.S. in physics, and in 1958 a Ph.D. in physics.

He began his scientific career at the Navy Electronics Laboratory in 1958, joined the staff of Colorado State University in 1959 as Assistant Professor, and served as a consultant to the Applied Physics Group at the SACLANT ASW Research Center, La Spezia, Italy, from 1961 to 1963. He then returned to Colorado State University, where from 1963 to 1968 he served as Associate Professor and Professor of Physics and, during his last year there, as Acting Chairman of the Department of Physics. He came to NRL with the appointment of Associate Director of Research in September 1968.

Dr. Goodman's research interests are centered on acoustic propagation, scattering, and physical acoustics. He also maintains an active interest in solid state Physics.

Dr. Goodman is a member of the American Physical Society, the Acoustical Society of America, the American Geophysical Union, the American Institute of Physics, Sigma Xi, Phi Kappa Phi, and Tau Beta Pi. He was also a member of the Board of Trustees of the Colorado State University Research Foundation and the NAS/NRC Committee on Undersea Warfare.



Key Personnel

Dr. R. R. Goodman	Associate Director of Research for Oceanology
Mr. A. L. Gotthardt	Ship Facility Group
Dr. J. C. Munson	Superintendent, Acoustics Division
Mr. R. J. Bobber	Superintendent, Underwater Sound Reference Division
Dr. V. J. Linnenbom	Superintendent, Ocean Sciences Division
Dr. J. P. Walsh	Superintendent, Ocean Technology Division

SHIP FACILITY GROUP

Basic Responsibilities

The Ship Facility Group is responsible for coordinating and providing ship services, sea-going facilities, and specialized expertise common to and required by the at-sea experiments of Research Divisions under the Associate Director of Research for Oceanology.

Key Personnel

Mr. A. L. Gotthardt — Head, Ship Facility Group

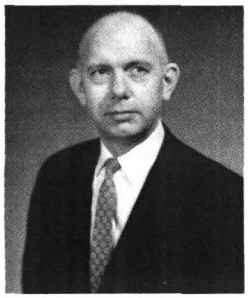
Mr. A. L. Gotthardt

Personnel Complement

On Board: 14

Total Estimated R&D Funding

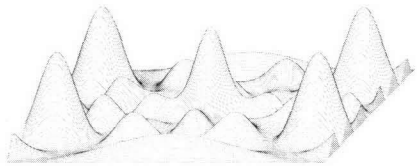
Fiscal Year 1971: $2,300,000



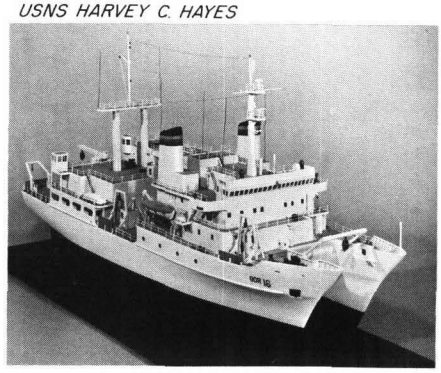
Dr. J. C. Munson

Acoustics Division

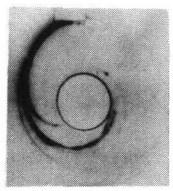
ELEVATION-AZIMUTH ARRAY RESPONSE



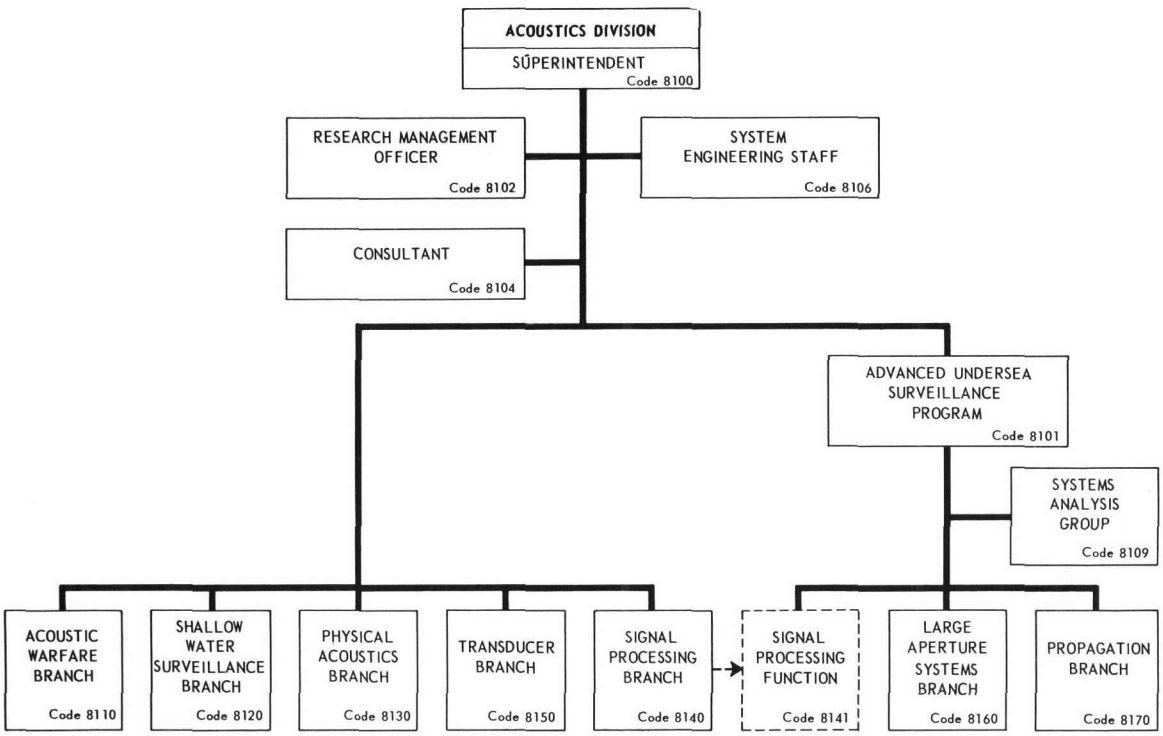
USNS HARVEY C. HAYES



- ACOUSTIC WARFARE
- LARGE APERTURE SYSTEMS
- PHYSICAL ACOUSTICS
- SIGNAL PROCESSING
- TRANSDUCER
- PROPAGATION
- SHALLOW WATER SURVEILLANCE



CREEPING WAVE PHENOMENA



Basic Responsibilities

The Acoustics Division has major responsibility for conducting basic research and development in undersea acoustic surveillance. The spectrum of work covered in the program ranges from theoretical acoustics through concept formulation, validation of operational concepts, and systems analysis. The Division also conducts theoretical and experimental research programs in physical acoustics, ocean acoustics, and predictive oceanography to develop theory and models of the interaction of acoustics with structures and with the ocean environment. The theoretical and experimental research programs support the Navy undersea warfare program, the Advanced Undersea Surveillance Program of the Acoustics Division, and the Division's investigations in the fields of transducers, signal processing, and acoustic warfare. The Division participates strongly in formulating the Navy's ASW program, and it renders consultative services to the Navy, the Department of Defense, other government agencies, and contractors.

Staff Activities

System Engineering

- Support and ship facility
- Acoustic sources
- Engineering research

Systems Analysis

- Systems studies
- Strategic and tactical systems planning and evaluation

Branches

Acoustic Warfare

- Acoustic countermeasure techniques
- Surveillance system countermeasures
- Acoustic warfare threat assessment

Transducer

- Basic radiation theory
- Electroacoustic modeling
- Transducer physical models
- Transducer mathematical models
- Calibration of large transducer arrays
- Transducer materials research
- Acoustic array calculations

Physical Acoustics

- Microacoustics
- Low frequency target strength modeling
- Ultrasonic investigation of liquids and amorphous solids

Signal Processing

- Signal processing and display
- Information processes for underwater acoustics

Shallow Water Surveillance

- Boundary interactions

Large Aperture Systems

- Active target detection and classification
- Propagation, coherency, and wave front behavior
- Low frequency monostatic and bistatic reverberation studies

Propagation

- Long-range propagation models
- Application of low-range low-frequency propagation
- Scattering from ocean bottom, surface, and volume
- Natural and man-made noise
- Arctic underwater acoustics

Key Personnel

Name	*Title*
Dr. J. C. Munson	Superintendent
Mr. A. T. McClinton	Head, System Engineering Staff
Mr. R. R. Rojas	Head, Advanced Undersea Surveillance Program
Dr. J. C. Knight	Head, Systems Analysis Group
Mr. R. H. Mathes	Head, Acoustic Warfare Branch
Mr. R. H. Ferris	Head, Shallow Water Surveillance Branch
Dr. C. M. Davis, Jr.	Head, Physical Acoustics Branch
Mr. H. L. Peterson	Head, Signal Processing Branch (Acting)
Mr. S. Hanish	Head, Transducer Branch
Dr. B. B. Adams	Head, Large Aperture Systems Branch
Dr. H. P. Bucker, Jr.	Head, Propagation Branch

Personnel Complement

On Board: 146

Total Estimated R&D Funding

Fiscal Year 1971: $9,184,000

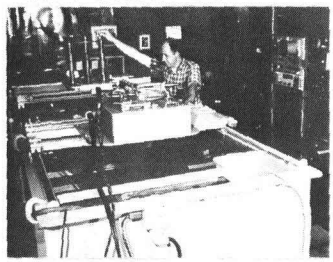
Underwater Sound Reference Division

Mr. R. J. Bobber

- UNDERWATER ELECTROACOUSTIC MEASUREMENT METHODS
- UNDERWATER ELECTROACOUSTIC STANDARDS
- UNDERWATER ELECTROACOUSTIC TEST & EVALUATION

UNDERWATER SOUND REFERENCE DIVISION, ORLANDO, FLORIDA

HIGH-FREQUENCY LABORATORY



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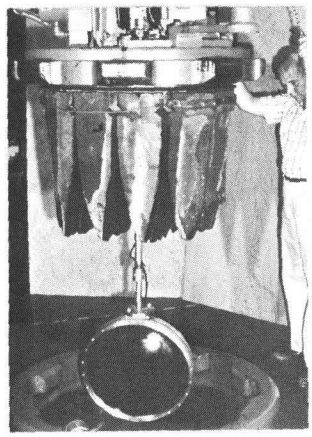
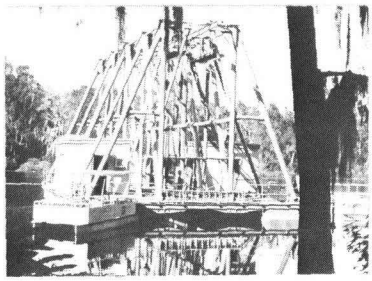
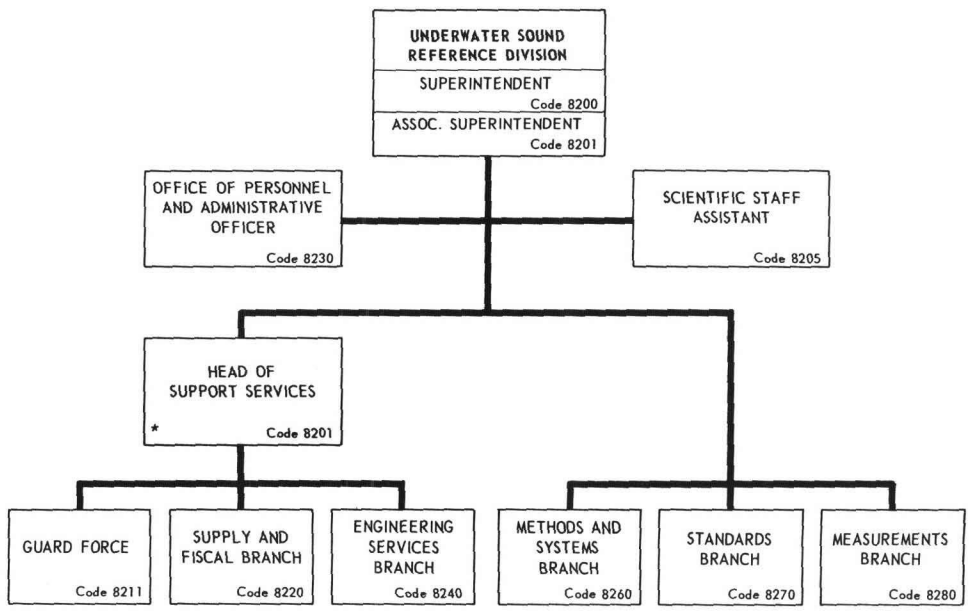




LEESBURG FACILITY-CALIBRATION BARGE



*Indicates collateral duty as Assoc. Superintendent.

Basic Responsibilities

The Underwater Sound Reference Division is a focal point in the Navy for standardization in the science and technology of underwater sound measurements. Its research and development program is aimed at expanding the state of the art and providing Navy in-house expertise. Reference calibration measurements in a large complex of specialized facilities and calibrated standard transducers are available to all naval activities and contractors in support of undersea warfare programs.

Research and Development Branches

Methods and Systems

- Calibration theory
- Measurement methods
- Digital and analog systems
- Acoustic absorption
- Cavitation studies

Standards

- Transducer materials
- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Vibration analysis techniques
- Standard loan services

Measurements

- Standard calibration services
- Sonar transducer test and evaluation
- Measurements on acoustic materials
- Simulated deep-submergence measurements
- Measurement facility development

Key Personnel

Name	*Title*
Mr. R. J. Bobber	Superintendent
Mr. D. T. Hawley	Associate Superintendent
Mr. J. M. Taylor	Scientific Staff Assistant
Mr. J. C. Michael	Supply and Fiscal Officer
Mrs. A. Z. Shehee	Personnel and Administrative Officer
Mr. J. F. Prandoni	Head, Engineering Services Branch
Mr. A. Z. Robinson	Head, Methods and Systems Branch
Mr. I. D. Groves	Head, Standards Branch
Dr. W. L. Paine	Head, Measurements Branch

Personnel Complement

On Board: 99
(Graded 79, Ungraded 20)

Total Estimated R&D Funding

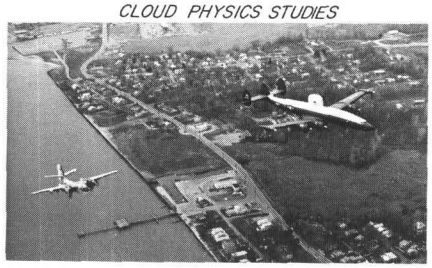
Fiscal Year 1971: $1,400,000

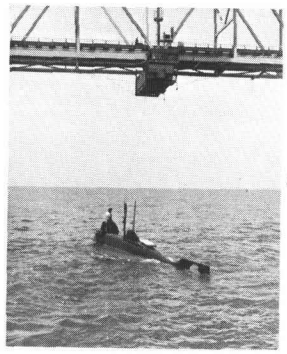
Dr. V. J. Linnenbom

Ocean Sciences Division

- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- PHYSICAL OCEANOGRAPHY
- MARINE BIOLOGY & BIOCHEMISTRY
- NONACOUSTIC ASW

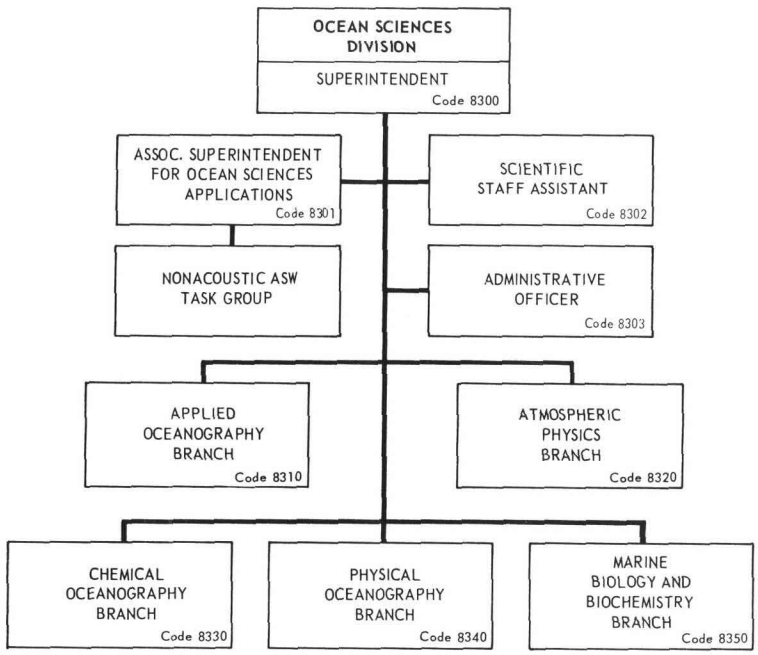
CLOUD PHYSICS STUDIES





SURFACE EFFECTS

NANSEN BOTTLE PREPARATION



Basic Responsibilities

The Ocean Sciences Division conducts basic and applied research and development in the ocean sciences. Included are studies of the physics, chemistry, geology, and biology of the oceans directed toward an improved understanding and use of the oceans as the major operating environment of the Navy. Practical results lead ultimately to improvement in the design and effectiveness of naval equipment, materials, and systems.

Staff Activities

Nonacoustic ASW (R&D) Task Group

Branches

Applied Oceanography

- Nonacoustic detection of submarines
- Hydrodynamics of submerged bodies
- Infrared characteristics of the ocean

Atmospheric Physics

- Air-sea interactions
- Atmospheric dynamics
- Cloud physics
- Weather instrumentation

Chemical Oceanography

- Physical and analytical chemistry of seawater, dissolved gases, and marine sediments

Physical Oceanography

- Hydrodynamics and turbulence of the oceans
- Marine geophysics

Marine Biology & Biochemistry

- Biodegradation of materials in the marine environment
- Organic chemistry of seawater
- Biochemistry of marine organisms

Key Personnel

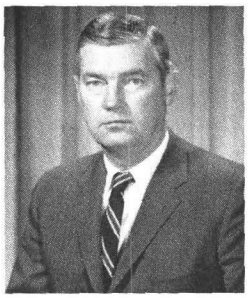
Name	*Title*
Dr. V. J. Linnenbom	Superintendent
Dr. J. E. Elliot	Associate Superintendent
Dr. A. H. Schooley	Senior Research Scientist
Mr. J. I. Hoover	Consultant
Mr. H. L. Clark	Head, Applied Oceanography Branch
Dr. J. E. Dinger	Head, Atmospheric Physics Branch
Dr. C. H. Cheek	Head, Chemical Oceanography Branch
Dr. J. E. Elliot	Head, Physical Oceanography Branch (Acting)
Dr. J. M. Leonard	Head, Marine Biology and Biochemistry Branch

Personnel Complement

On Board: 92

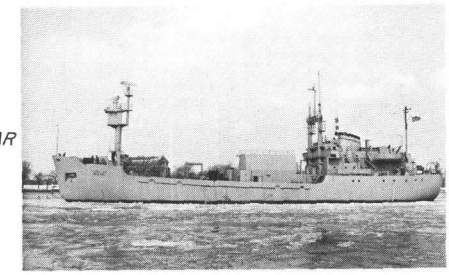
Total Estimated R&D Funding

Fiscal Year 1971: $3,391,000



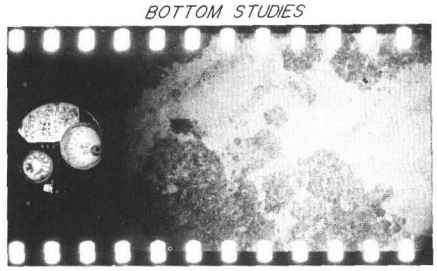
Dr. J. P. Walsh

Ocean Technology Division

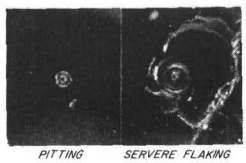


MIZAR

BOTTOM STUDIES

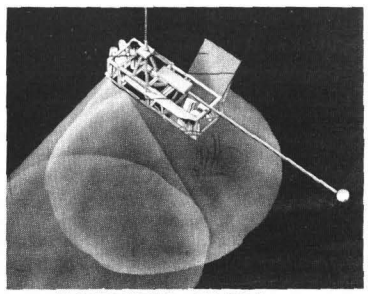


- OCEAN ENGINEERING
- OCEAN MATERIALS CRITERIA
- OCEAN STRUCTURES

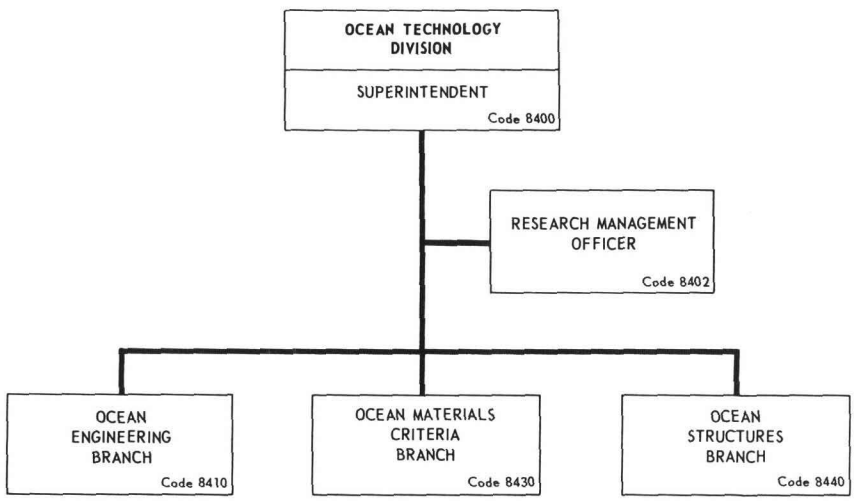


PITTING SERVERE FLAKING

HYDROSTATIC PRESSURE FAILURE STUDIES



UNDERWATER CAMERA



Basic Responsibilities

The Ocean Technology Division researches, develops, and applies specialized equipment, instrumentation, and techniques for conducting ocean and ocean-floor operations, and it evolves operational technology for advanced systems. The Division utilizes advanced materials and design technology for engineering optimization of required equipment. It also conducts research activities in select areas of ocean technology with coupling and support activities related to other ongoing research and development in these and other fields of interest. This Division, in conjunction with other Divisions of NRL and out-of-house agencies, brings the collective expertise to bear on crucial problems.

Branches

Ocean Engineering

- Deep-ocean instrumentation and investigations
- Hydrodynamics of deep towing
- Reliable acoustic paths

Ocean Materials Criteria

- Fracture mechanics and fracture strength
- Plastic flowing
- Compression failure mechanisms
- Armor research and development
- Deep submergence materials-structures
- Missile component failure
- Nondestructive testing

Ocean Structures

- Shipboard shock fundamentals
- Shock protection for weapons systems
- Methods for design against shock
- Fracture mechanics design studies
- Developmental studies of prototypes
- Shock strength of materials
- Shock propagation and instrumentation
- Hydromechanic studies

Key Personnel

Name	*Title*
Dr. J. P. Walsh	Superintendent
Dr. R. O. Belsheim	Consultant
Dr. W. H. Vaughan	Consultant
Mr. C. L. Buchanan	Head, Ocean Engineering Branch
Dr. I. Wolock	Head, Ocean Materials Criteria Branch (Acting)
Mr. G. J. O'Hara	Head, Ocean Structures Branch (Acting)

Personnel Complement

On Board: 64

Total Estimated R&D Funding

Fiscal Year 1971: $2,472,000

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The Support Services Department

Captain Seymour N. Ross, USN
Director of Support Services

Captain Seymour N. Ross is a native of Newburgh, New York. He received his commission and B.S. degree from the U.S. Naval Academy in 1947; a Nav. E. degree from the Massachusetts Institute of Technology in 1952; and in 1957, a B.S. in metallurgy from the Carnegie Institute of Technology. He has also done graduate work in international relations at the University of California.

Prior to coming to NRL, Captain Ross served as Fleet Maintenance Officer with the staff of Commander-in-Chief, U.S. Naval Forces Europe, with Headquarters in London, England. As additional duty, he was Assistant Supervisor of Salvage, Europe. Previously, he held positions at the Boston Naval Shipyard, the Shipbuilding Liaison Office at The Hague, The Netherlands, in the Design and Research and Development Divisions of the Bureau of Ships, and in the Development Divisions of the Office of the Chief of Naval Operations. Captain Ross became Director of Support Services on September 30, 1969.

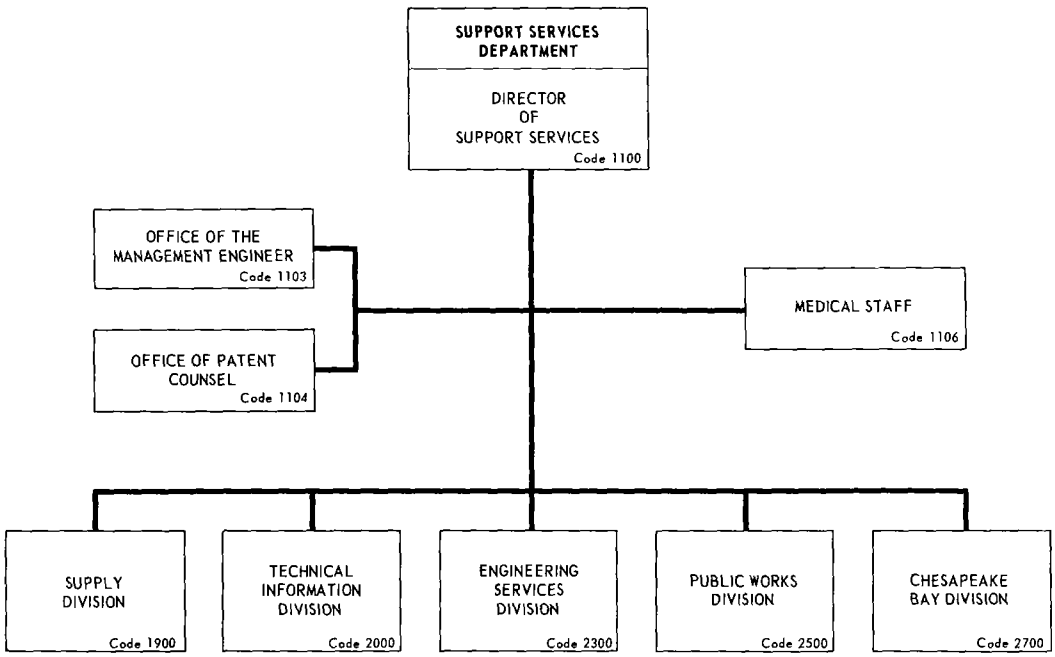
Captain Ross is a member of Sigma Xi, the American Society of Naval Engineers, and the Marine Technology Society.

THE SUPPORT SERVICES DEPARTMENT

The Director of Support Services is a naval officer with the appropriate rank, training, and experience. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required to provide a wide spectrum of services in support of the work of the Research Department.

Key Personnel

Name	*Title*	Code
CAPT S. N. Ross, USN	Director of Support Services	1100
Mr. S. L. Cohen	Management Engineer	1103
Dr. A. L. Branning	Patent Counsel	1104
LT D. H. Lederer, MC, USN	Medical Officer	1106
CDR J. R. Webb, SC, USN	Supply Officer	1900
Mr. E. L. Smith	Head, Technical Information Division	2000
CDR C.M. Kunstmann, USN	Engineering Services Officer	2300
CDR J. B. Groff, CEC, USN	Public Works Officer	2500
CDR R. S. Mason, USN	Chesapeake Bay Division Officer	2700



OFFICE OF THE MANAGEMENT ENGINEER

Basic Responsibilities

The Office of the Management Engineer provides staff support to management officials of the Laboratory in matters of administrative operations, management control, and facilities planning.

Key Personnel

Mr. S. L. Cohen	Management Engineer
Mr. A. M. Toscano	Deputy Management Engineer

Personnel Complement

On Board: 7

Mr. S. L. Cohen

OFFICE OF PATENT COUNSEL

Basic Responsibilities

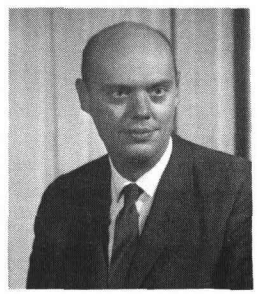
The Office of Patent Counsel provides services concerning inventions, patents, trademarks, copyrights, and other related matters. Patent applications are prepared, filed, and prosecuted on NRL inventions of significance to the Government. The Patent Counsel serves as consultant and adviser on patent and data clauses in R&D and procurement contracts. Assistance is provided the Research Department through state-of-the-art searches in the patent literature pertinent to particular research problems.

Key Personnel

Dr. A. L. Branning	Patent Counsel
Dr. J. G. Murray	Deputy Patent Counsel

Personnel Complement

On Board: 22
(Includes NRL and ONR)



Dr. A. L. Branning

MEDICAL STAFF

Basic Responsibilities

The Medical Staff provides a comprehensive industrial health program. Its members serve in an advisory capacity on the Radiological, Safe Driving, Eye Hazard, and other Laboratory Committees, as directed.

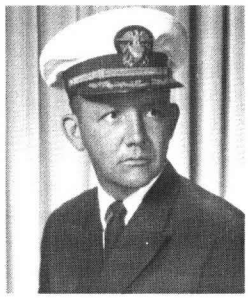
Key Personnel

LT D. H. Lederer, MC, USNR	Medical Officer
Mrs. H. N. East, RN	Occupational Health Nurse

Personnel Complement

On Board: 7
(Civilian 2, Military 5)

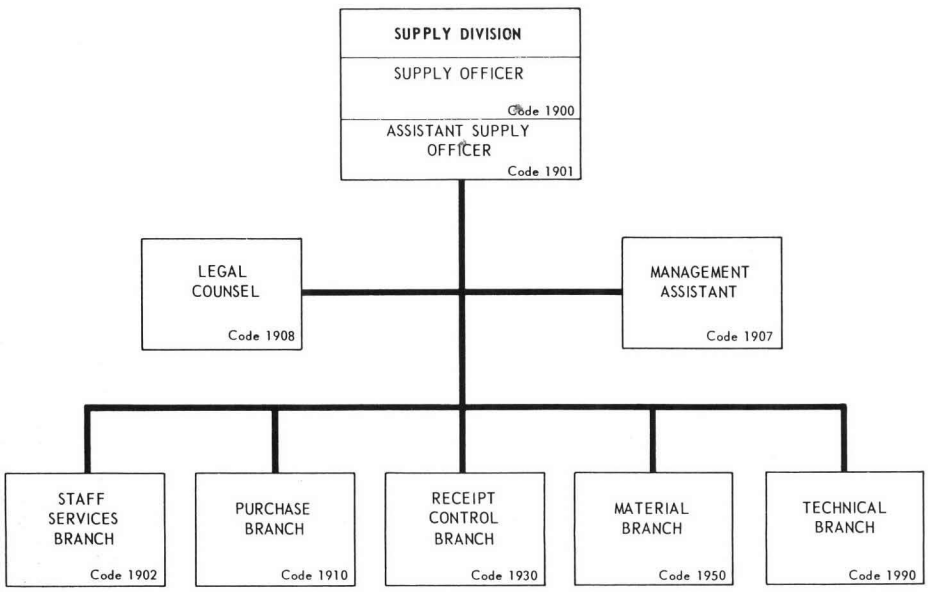
LT D. H. Lederer



Supply Division

CDR J. R. Webb, USN

- STAFF SERVICES
- PURCHASE AND CONTROL
- MATERIAL
- TECHNICAL



Basic Responsibilities

The Supply Division provides service functions to the Laboratory including the operation of supply issue stores, procurement of equipment, material, and contractual services; receipt, inspection, and delivery of material and equipment; storage of inactive laboratory equipment; packing; shipping; traffic management; and survey and disposal of excess and unusable property.

During FY 1970 the Supply Division occupied 204,351 square feet of building space; its stores inventory value averaged $880,000; procurements totalled $45,500,000; stores issued totalled $1,900,000; and disposals totalled $3,300,000.

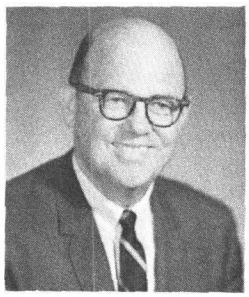
Key Personnel

Name	*Title*
CDR J. R. Webb, SC, USN	Supply Officer
LT J. R. Stafford, SC, USN	Assistant Supply Officer
Mr. A. S. Horton	Legal Counsel
Mr. L. Woods	Management Assistant
Mr. A. W. Medley, Sr.	Head, Staff Services Branch
Mr. H. E. Senasack	Head, Purchase Branch
Mrs. V. S. Thomas	Head, Receipt Control Branch
Mr. H. W. Dickinson	Head, Material Branch
Mr. R. R. Black	Head, Technical Branch

Personnel Complement

On Board: 141

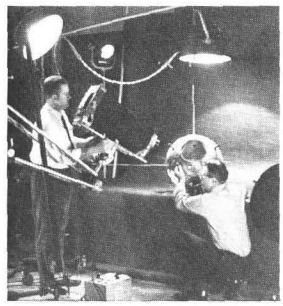
(Graded 86, Ungraded 52, Military 3)

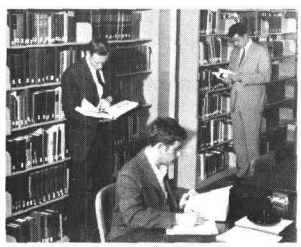


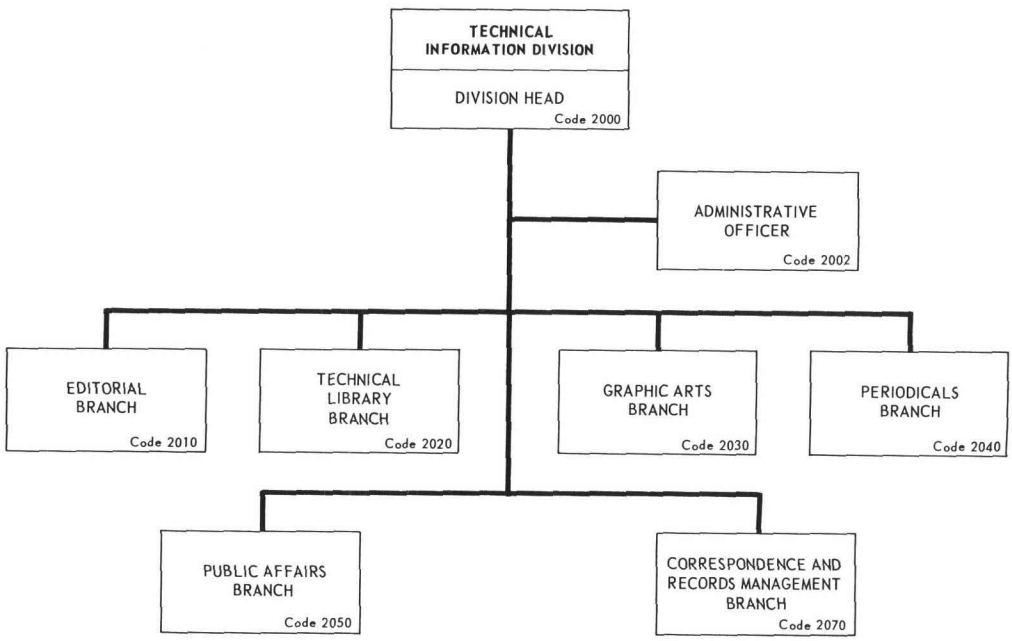
Mr. E. L. Smith

Technical Information Division

- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- PERIODICALS
- PUBLIC AFFAIRS
- CORRESPONDENCE AND RECORDS MANAGEMENT







Basic Responsibilities

The Technical Information Division plans and administers the Laboratory's program of preparing and disseminating the results of scientific research through official publications, scientific journals, presentations, films, exhibits, and news media. It provides centralized professional services to both NRL and ONR in writing, editing, printing, exhibits, photography, graphic arts, public affairs, documentation, language-translations, and mail-records services. It operates one of the Navy's largest integrated technical libraries with holdings of 200,000 bound volumes and 350,000 technical reports.

Key Personnel

Name	*Title*
Mr. E. L. Smith	Head, Technical Information Division
Mrs. D. P. Baster	Librarian (Acting)
Mr. W. H. Ramey	Head, Graphic Arts Branch
Mr. W. M. Leak	Head, Periodicals Branch
Mr. I. S. Rudin	Head, Editorial Branch
Mr. H. S. Poole	Head, Public Affairs Branch (Acting)
Mrs. M. G. Beall	Head, Correspondence and Records Management Branch

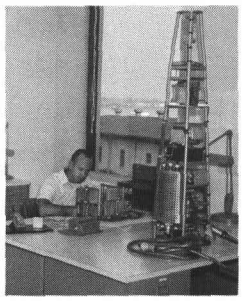
Personnel Complement

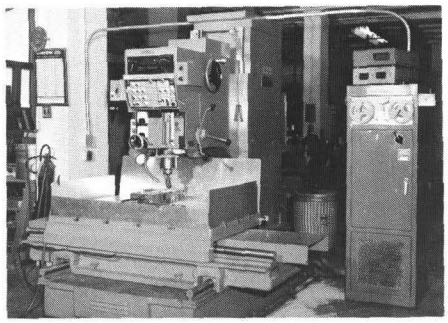
On Board: 160

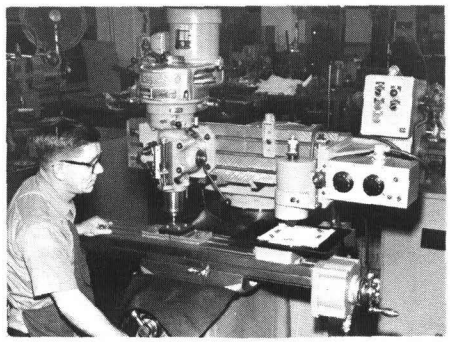
(Graded 144, Ungraded 16)

CDR C. M. Kunstmann, USN

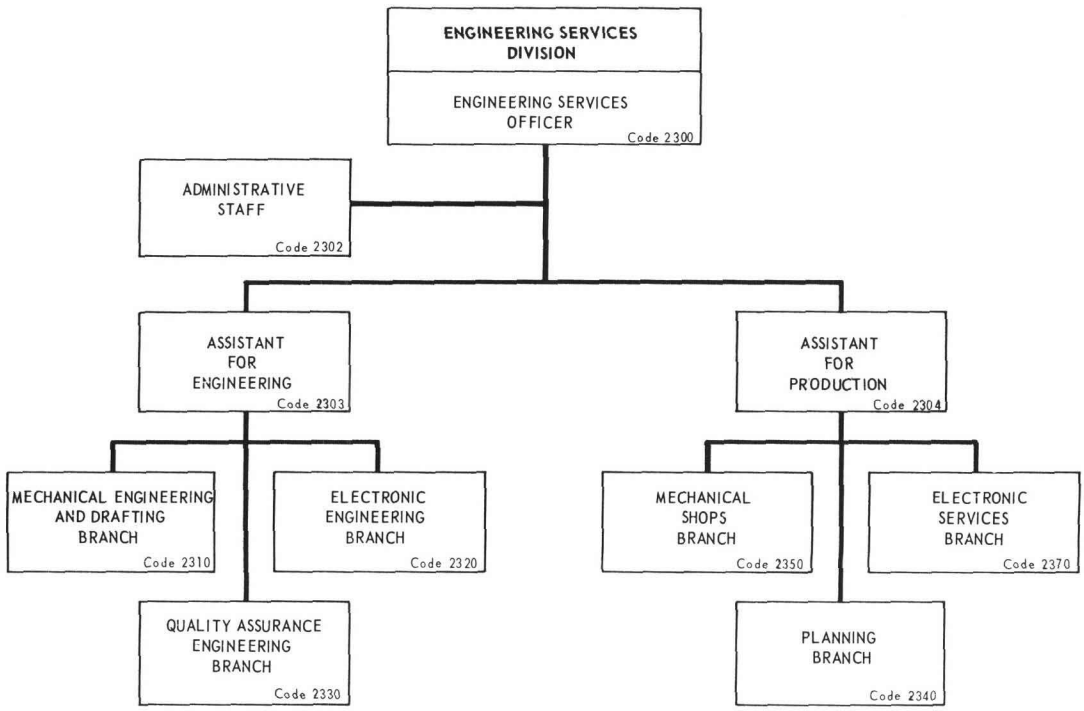
Engineering Services Division







- MECHANICAL ENGINEERING AND DRAFTING
- ELECTRONIC ENGINEERING
- MECHANICAL SHOPS
- CHEMICAL PROCESSES SHOPS
- ELECTRONIC SERVICES
- PLANNING & PRODUCTION ENGINEERING
- PROJECT ENGINEERING



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

Name	*Title*
CDR C. M. Kunstmann, USN	Engineering Services Officer
Mr. P. R. Shifflett	Assistant for Engineering
Mr. J. P. Manning	Assistant for Production
Mr. C. T. McComb	Head, Mechanical Engineering and Drafting Branch
Mr. J. Brotzman	Head, Electronic Engineering Branch
Mr. E. Trexler	Head, Quality Assurance Engineering Branch
Mr. P. C. Buck	Head, Planning Branch
Mr. D. R. Eggleston	Head, Mechanical Shops Branch
Mr. J. L. Leizear	Head, Electronic Services Branch

Personnel Complement

On Board: 493

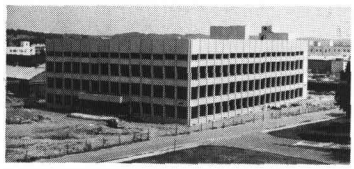
(Graded 160, Ungraded 332, Military 1)

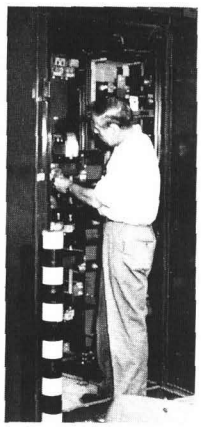
Management & Staff	57
Engineers	36
Technicians	107
Journeymen	205
Machine Operators & Helpers	35
Apprentices	53

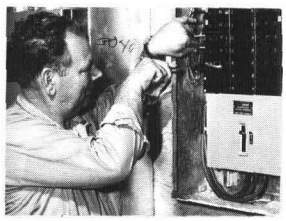
Public Works Division

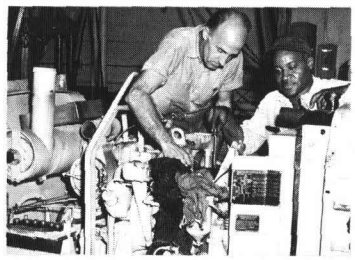
CDR J. B. Groff, USN

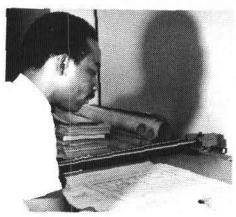
- ENGINEERING
- ADMINISTRATION
- MAINTENANCE AND UTILITIES
- MAINTENANCE CONTROL
- TRANSPORTATION
- CONSTRUCTION
- PROJECTS PROGRAMMING

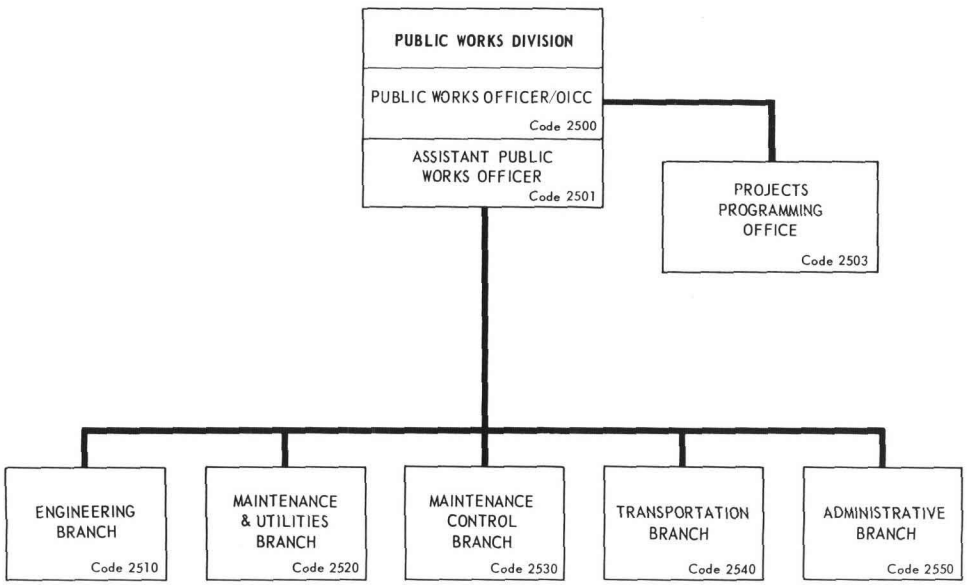












Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight-handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

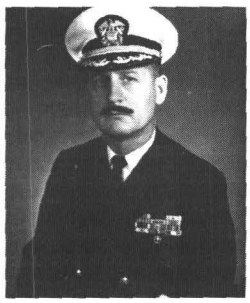
Key Personnel

Name	*Title*
CDR J. B. Groff, CEC, USN	Public Works Officer/Officer in Charge of Construction
LTJG W. E. Moore, CEC, USNR	Projects Programming Office
Mr. G. H. Seaver, Jr.	Projects Programming Office
Mr. J. R. Lescault	Head, Administrative Branch
Mr. C. R. Parsons	Head, Engineering Branch
Mr. L. Carpenter	Head, Maintenance & Utilities Branch (Acting)
Mr. R. O. Weidman	Head, Maintenance Control Branch
Mr. C. P. Trexler	Head, Transportation Branch

Personnel Complement

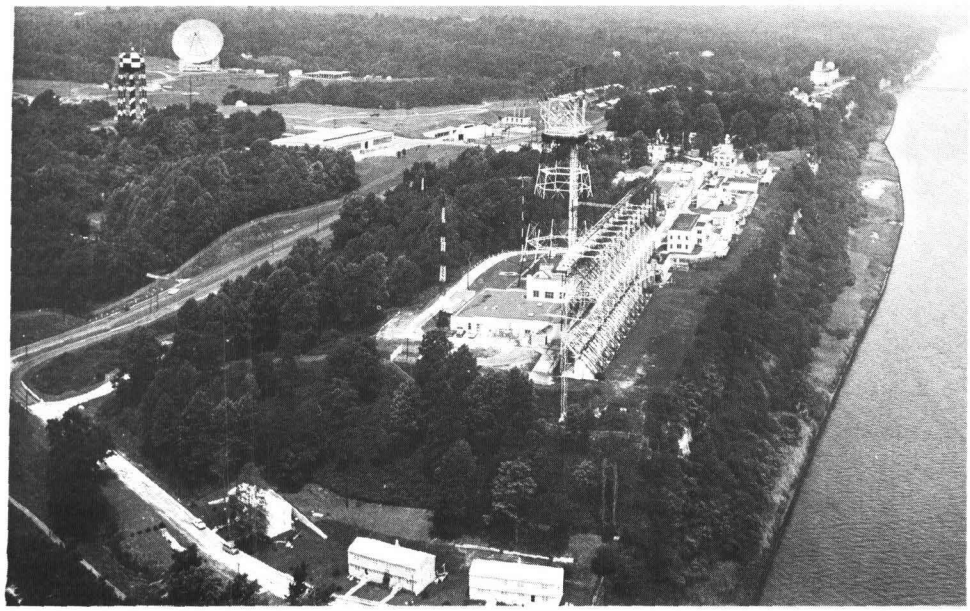
On Board: 362

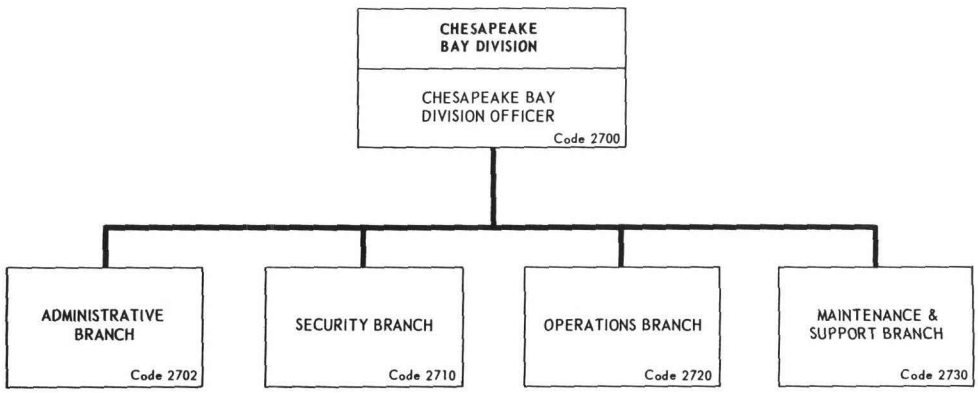
(Graded 39, Ungraded 321, Military 2)



CDR R. S. Mason, USN

Chesapeake Bay Division





Basic Responsibilities

The Chesapeake Bay Division provides and maintains facilities and services for test, development and evaluation of radar, radio, and fire control equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

The Physical Plant

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 197 structures of various size and construction, six of which are major laboratory buildings. There is over 200 feet of usable dock space with a water depth of 4 to 7 feet, located 2 miles north of the main site. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a distance of about 10 miles; the Theodolite House, at North Beach; and the Off-shore Platform, approximately 2 miles southeast of CBD in the Bay.

One 36-foot diesel-powered boat and five wherries are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters.

Key Personnel

Name	*Title*
CDR R. S. Mason, USN	Division Officer
Mr. F. R. Theodore	Administrative Officer
Mr. K. V. Davis	Security Officer
BMCM G. VandenBerg, USN	Operations Officer
Mr. R. M. Conlyn	Station Engineer

Research Division Representatives

Applications Research Division

Mr. A. C. Grosvenor, Applied Physics Branch
Mr. C. D. Porter, Dynamics Branch

Radar Division

Mr. M. W. Lehman, Radar Geophysics Branch and Division Representative
Mr. J. R. Ward, Airborne Radar Branch
Mr. W. K. Fliss, Search Radar Branch

Optical Sciences Division

Mr. T. H. Cosden, Infrared Branch

Personnel Complement

On Board: 87

(Graded 35, Ungraded 50, Military 2)

Awards Received by Civilian Employees

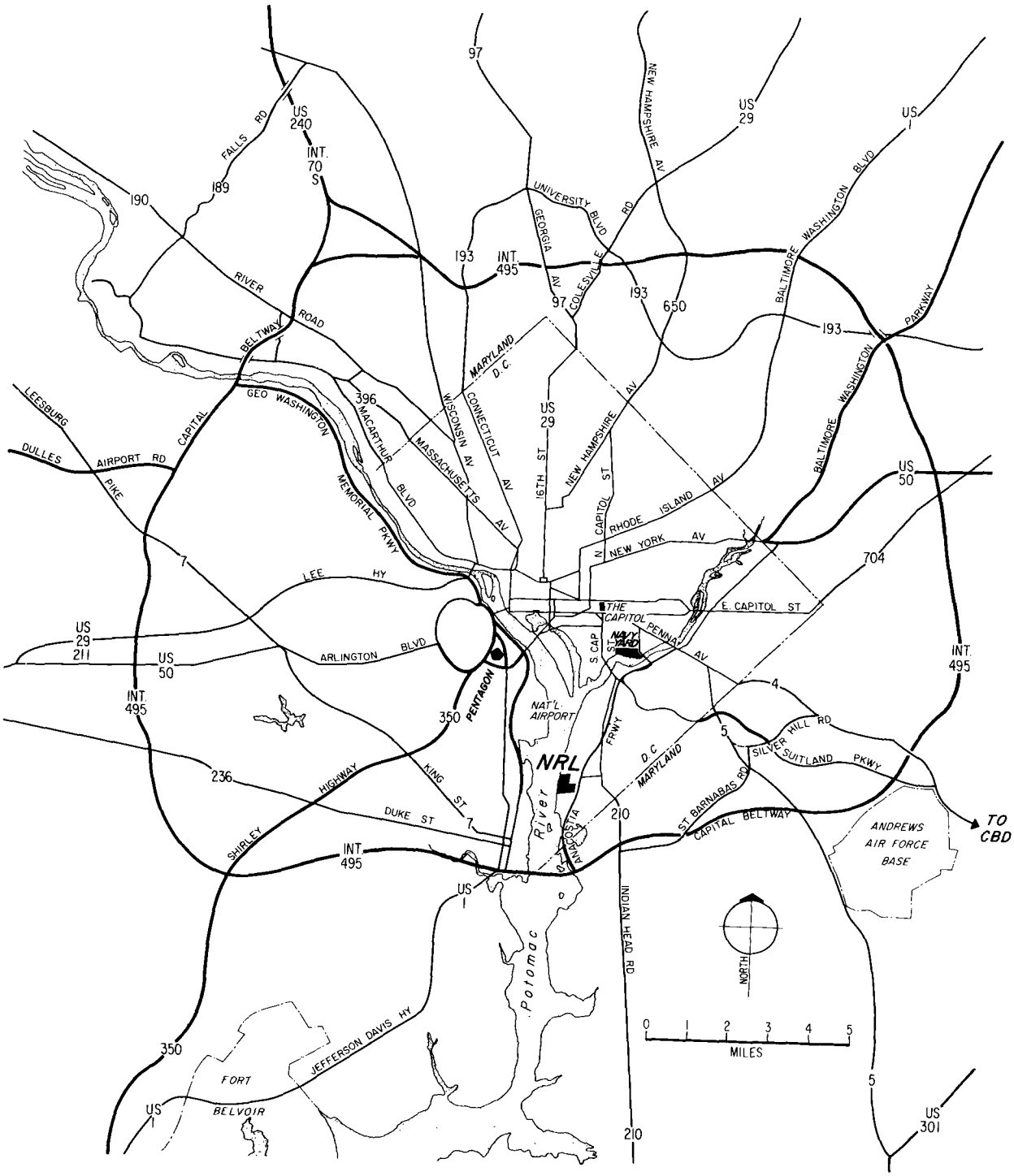
As of July 1, 1970

Government Awards	Number
The Medal of Merit from the President of the United States	1
The Certificate of Merit from the President of the United States	11
National Medal of Science from the President of the United States	1
The President's Award for Distinguished Federal Civilian Service	2
Department of Defense Distinguished Civilian Service Award	4
Department of Defense Certificate of Merit	1
Department of the Navy Award for Distinguished Achievement in Science	2
Navy Distinguished Civilian Service Award	55
Navy Captain Robert Dexter Conrad Award	4
Navy Superior Civilian Service Award (established 1959)	28
Navy Meritorious Civilian Service Award	189
E. O. Hulburt Annual Science Award (local NRL award)	15

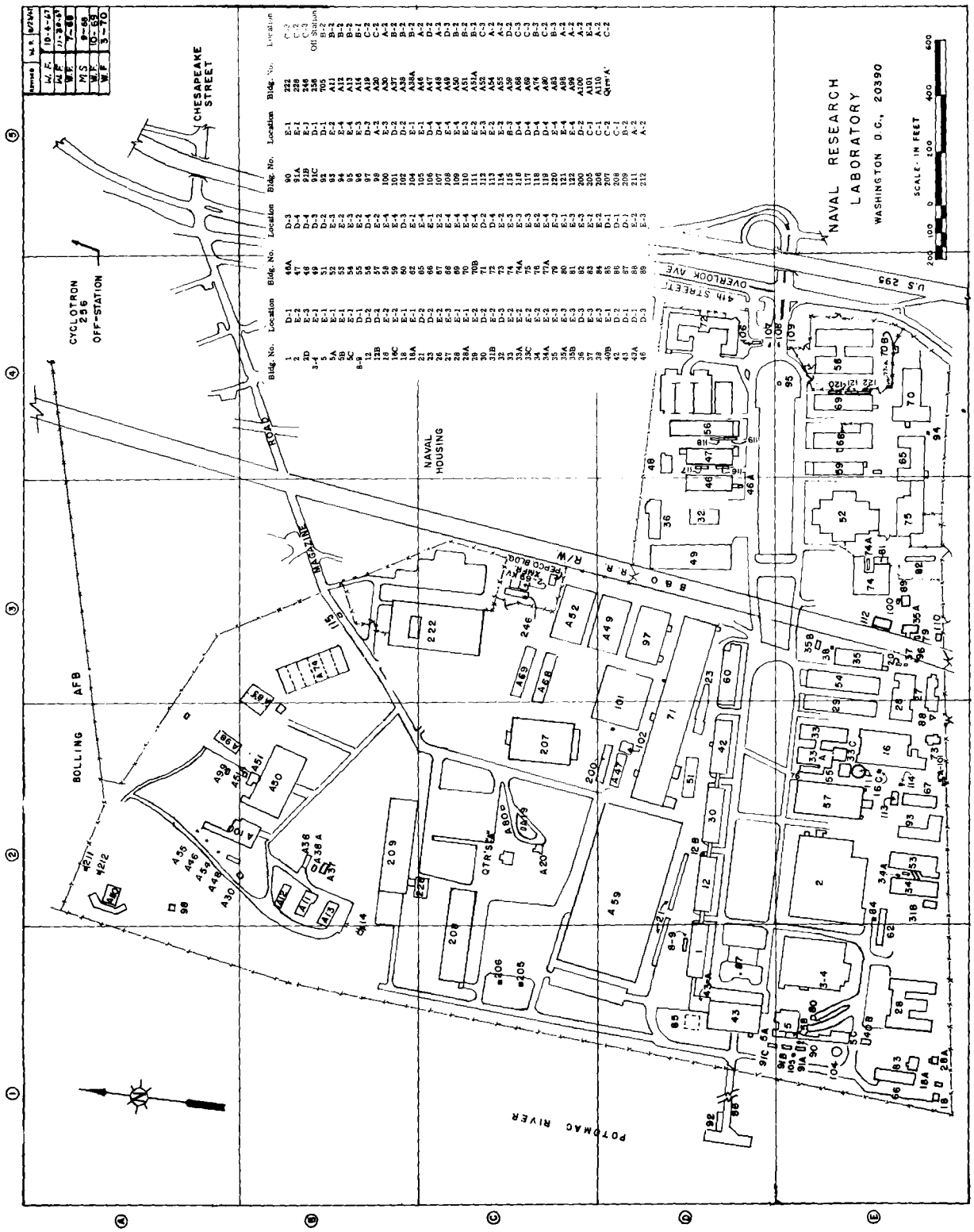
Non-Government Awards	
Rockefeller Public Service Award	1
Henry Draper Medal of the National Academy of Sciences	1
Engineering Science Award of the Washington Academy of Sciences	2
Physical Sciences Award of the Washington Academy of Sciences	4
Morris Liebmann Memorial Prize of the Institute of Radio Engineers	1
Medal of Merit Award of the Institute of Radio Engineers	2
Harry Diamond Award of the Institute of Radio Engineers	4
John Scott Medal of the City of Philadelphia	1
Patrons Award of the Institute of Radio Engineers (Washington section)	1
Reliability and Quality Control Award of the Radio Engineers Professional Group	1
Frederic Ives Award of the Optical Society of America	2
A. G. Bissell Memorial Award of the American Welding Society	1
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
John A. Penton Gold Medal Award of the American Foundrymen's Society	1
Eisenman Medal of the American Society for Metals (Philadelphia Chapter)	1
Burgess Prize Award of the American Society for Metals	3
Burgess Memorial Lecture of the American Society for Metals (Washington Section)	1
Charles B. Dudley Medal of the American Society for Testing Materials	1
Sam Tour Award of the American Society for Testing Materials	1
Gold Medal Award of the American Society of Naval Engineers	2
Trent-Crede Award of the Acoustical Society of America	1

Non-Government Awards (Continued)	Number
District Meritorious Certificate Award of the American Welding Society	1
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	1
A. K. Doolittle Award of the National American Chemical Society	1
Kendall Company Award of the American Chemical Society	1
Hillebrand Prize of the American Chemical Society	2
William Blum Award of the Washington-Baltimore Electrochemical Society	2
National Award of the American Society of Lubrication Engineers	1
Annual Award of the Society for Applied Spectroscopy	2
E. Edward Pendray Award of the American Rocket Society	1
James H. Wyld Memorial Award of the American Rocket Society	1
Space Science Award of the American Institute of Aeronautics and Astronautics	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	1
Janssen Medal of the French Photographic Society	1
Ancel Prize of the French Photographic Society	1
Progress Award of the Photographic Society of America	1
Professional Achievement Award of the D. C. Council of Engineers and Architectural Studies	1
National Capital Award of the D. C. Council of Engineers and Architectural Studies	3
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Mayo D. Hersey Award of the American Society of Mechanical Engineers	1
Service to Mankind Award of the Washington Sertoma Club	1
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	
Pure Science Award of the Scientific Research Society of America (NRL Branch)	16
Applied Science Award of the Scientific Research Society of America (NRL Branch)	16
Arthur S. Fleming Award of the Washington Chamber of Commerce	2
Society of Women Engineers Achievement Award	1
Notre Dame Centennial of Science Award	2
M. Barry Carlton Award - Institute of Electrical and Electronics Engineerss	1
National Civil Service League Merit Citation	1
Brazilian Ordem do Merito Naval (Legion of Naval Merit) Cavaleiro	1

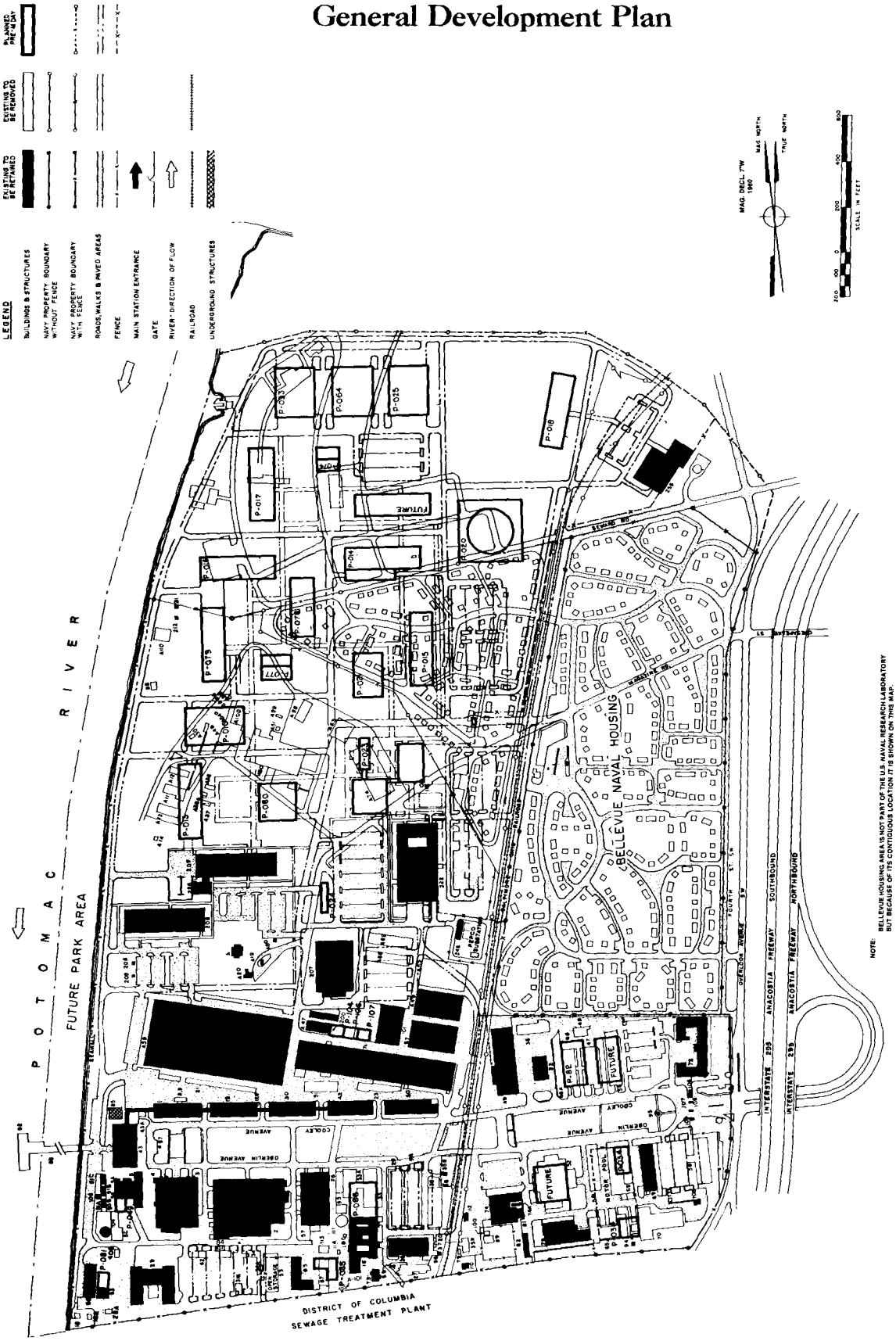
Location of NRL



Location of Buildings at Main Site



General Development Plan



Listing of NRL Sites and Facilities

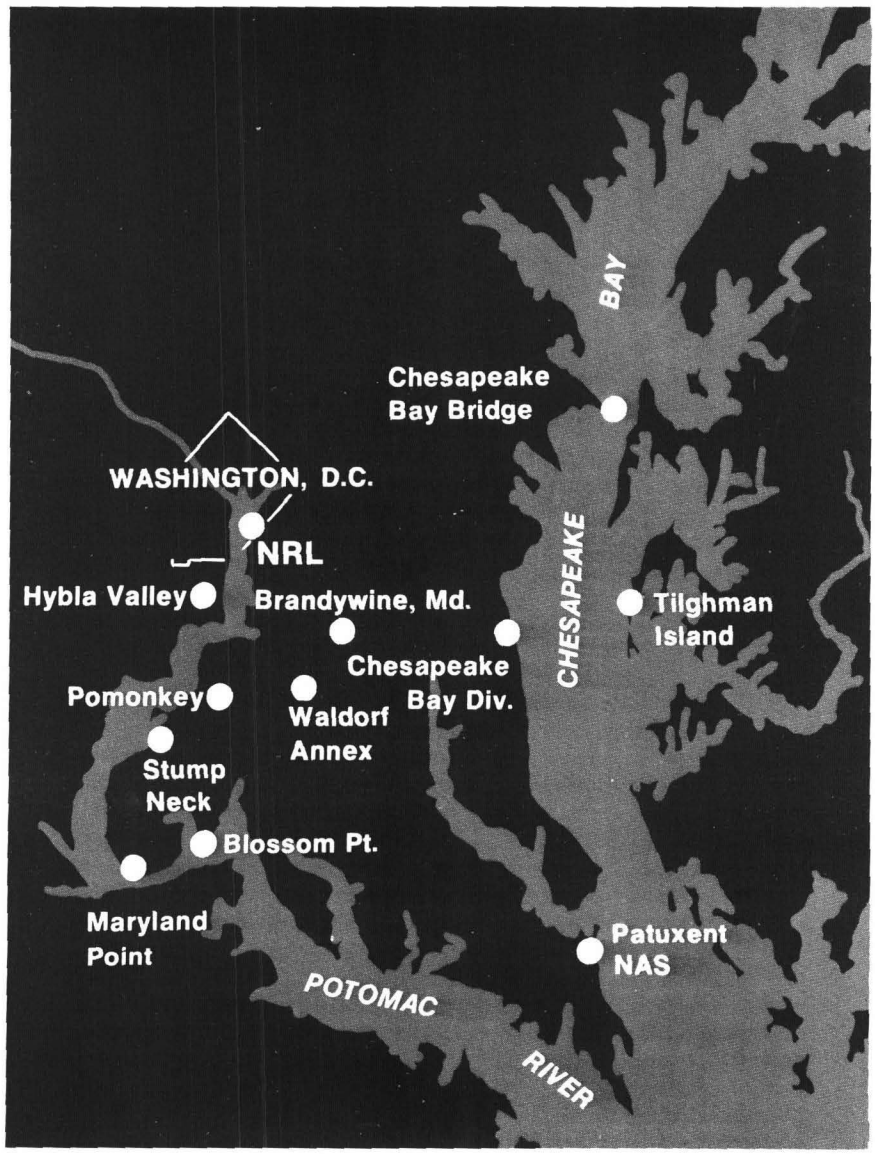
July 1, 1970

Station and Location	Acreage			Class I & II Plant Account	
	Fee Title	Easement or Purchase	Permit or Lease	Value	No. of Buildings and Structures
Naval Research Laboratory, Washington, D.C.	129.23		1.29	49,340,403	153
Radio Research Site, Blue Plains, D.C.			0.30	1,900	
Cyclotron Building Site Bolling Air Force Base, D.C.			5.24	3,572,675	1
Radio Research Site Coast Guard Radio Station, Alexandria, Va.			55.40		
Radio Test Area, Hybla Valley, Va.	1,262.46			60,000	
A&A Test Site, Shenandoah National Park Luray, Va.			NA		
Chesapeake Bay Division, Chesapeake Beach, Md.	174.90			10,010,723	184
Multiple Research Site, Tilghman Island, Md.	2.00			109,437	9
Dock Facility, Chesapeake Bay, Md.			0.60	18,533	5
Theodolite Station, North Beach, Md.			0.29	800	1
John Hyde Quarry Site, Westminister, Md.			15.25		
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			0.23	1,500	2
2 Foghorn Platforms, Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Chesapeake Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35.16		1,217,707	35
Radio Astronomy Observatory, Maryland Point, Md.	24.30		200.00	247,002	12
Radio Antenna Range, USAF Receiver Site, Brandywine, Md.			22.98		
Metallurgy and Radio Research Site, Stump Neck Annex, Naval Ordnance Station, Indian Head, Md.			5.90		
Free Space Antenna Range, Pomonkey, Md.	14.12	30.25		736,658	12
Navy Radio Research Station Sugar Grove, West Va.				74,091	2
Satellite Tracking Facility, Blossom Point, Md.			23.00		
*Satellite Tracking Station, Roma, Texas	27.84	1.00		725,239	5
*Satellite Tracking Station, Raymondville, Texas	171.55	2.85		1,215,770	16
Underwater Sound Reference Division, Orlando, Fla.	10.46			1,196,385	32
USRD, Leesburg Facility, Bugg Spring, Fla.			6.92	167,067	7
Marine Corrosion Laboratory, Key West, Fla.			NA		
*Underwater Track Facility Argus Island (near Bermuda)			NA		
Totals:	1,840.80	69.26	337.40	$68,693,990	

*Now being screened for disposal

Location of Principal Field Stations

Another station is located at Sugar Grove, W. Va. The Underwater Sound Reference Division is located at Orlando, Fla.



Research Platforms

Aircraft

1. The S2D (BUNO 149240) contains specially installed equipment and wing mounted pods for cloud physics research. It is also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.

2. The EC-121K (BUNO 128324) is used for wave propagation studies in the four-frequency radar system.

3. The EC-121K (BUNO 135753) is used for research in cloud physics, ECM, low-frequency radar, and various projects requiring minimal aircraft conversion.

4. The EC-121K (BUNO 141297) is used mainly by the Electronic Warfare Division to experiment, evaluate, and improve Fleet electronic warfare capabilities.

Available Ships

1. USNS GIBBS (T-AGOR-1)

2. USNS MIZAR (T-AGOR-11)

Under operational control of MSTSLANT. Scheduled by NRL.

3. USNS HAYES (T-AGOR-16)
   (To be delivered July 1971)

4. USS X-1 (SSX-1) is a one-sixth scale research submarine used mainly for oceanographic research. It is under operational control of COMSUBLANT, but is scheduled by NRL.

5. Fleet units are occasionally scheduled for NRL in support of CNO assigned projects by OPTEVFOR.

The Naval Research Laboratory has a continuing need for physical scientists, mathematicians, engineers, and supporting personnel. Vacancies are filled without regard to race, creed, color, sex, or national origin. Information concerning current vacancies will be gladly furnished upon request. Address all such inquiries to the Personnel Office (Code 1800), Naval Research Laboratory, Washington, D. C. 20390.